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The Impact Of Oil Spillage On Soil And Health Of Idu-Ekpeye Community, Port Harcourt.

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Abstract - **The study assessed the impact of oil spillage on the soil qualities of Idu-Ekpeye community in Ahoada West Local Government Area of Rivers State, one of the largest reservoirs of crude oil in the state. The investigation took place in the month of June, 2015. The methodology involved field sampling and analysis of physicochemical variables of soil samples, and questionnaire administration to elicit information from respondents in the study area. Loamy soil collected at depths 0-15cm,15-30cm from the coastal plain wetland was contaminated with crude oil and a chemical remediation treatment using degreaser and detergent used before analysis. Samples were also collected from a control site and standard procedures were adopted for the laboratory analysis of all collected samples. The results of questionnaires showed that the spill adversely affected the soil and drop in plant yield compelling the local farmers to abandon their traditional occupation to seek other occupations. The activities affected the health of the people as 42.10% of respondents reported fever,21.33% suffered from various respiratory ailments such as bronchitis, asthma,cough and 21.05% suffered from various gastrointestinal disorders. The results from analysed parameters showed that pH mean value of 6.15 at the spilled site is acidic which affected plant yield and nutrient availability adversely. The results further indicated that conductivity; iron, cadmium, THC, TOC, oil and grease were above the standard limits, while phosphate, nitrate, sulphate, magnesium and other measured parameters were within the limits. The analysis showed that the levels of the physicochemical variables of the soil at the spilled site cannot sustain plant yield and agricultural practice. These findings suggested that oil spillage affected the soil, agricultural activities and health of the residents. It is therefore recommended that standard health care delivery units be built in Idu-Ekpeye community to monitor and control health hazards caused by oil spillage.**

Keywords—Idu-Ekpeye, Oil spill, soil, physicochemical, questionnaire, analysis.

1. INTRODUCTION

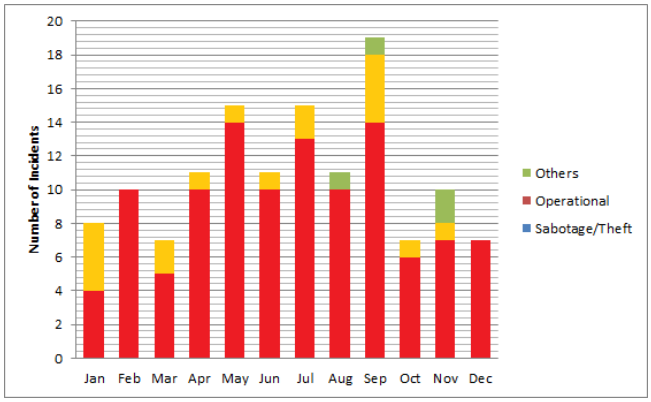
Oil production has continued to play a dominant role in the Nigerian economy, as a principal earner of foreign exchange and a source of power to run the nation's industries and domestic needs. On the other hand, the process of employing modern technology in the exploration, production, processing and storage of this God – given resources have resulted in the abuse of man's environment directly or indirectly. Water bodies such as surface water, lakes, groundwater, are polluted, leading to the destruction of useful aquatic biodiversity and community disturbances. Arable lands are also rendered unproductive due to loss of soil fertility. Diseases due to polluted lands, water and air are on the increase. All these problems are traceable to crude oil spillage. Oil spillage is the release of oil from its usual place of containment or storage tank into the environment which have negative impacts on humans and the environment at large (Odu,1996). Oil spill is a type of pollution that occurs mostly on water as well as on land and can have devastating effects on plant and animal life, and the environment. It occurs mainly as a result of human activity (exploration and transport of oil) and is the release of oil/liquid petroleum hydrocarbon into the aquatic environment such as oceans and coastal waters and on land. Spills may occur of crude oil (unrefined oil) from tankers, oil rigs and platforms and oil wells as well as during the transport of the refined petroleum product in vessels and tankers. Illegal waste oil dumping into oceans by organizations who do not want to invest in the cost of degrading their waste oils also contributes to increasing oil spills. Natural disasters such as hurricanes and earthquakes can also contribute to oil spills from oil rigs and wells as well as during transport in vessels and tankers. In a country like Nigeria where there is illegal oil bunkering by militants, oil spills occur quite frequently and are a major environmental challenge.

Oil spills largely affect the plumage of birds and fur of mammals by penetrating it and thereby affecting its insulation abilities thereby making them less able to adapt to temperature fluctuations and less buoyant in water. Mammals get hypothermia, which is a reduction in body temperature which may lead to death of both birds and mammals. Oil may reach the mammals liver or lungs poisoning it. Oils may also blind certain animals which reduces their ability to avoid predators and they may this be killed, which can

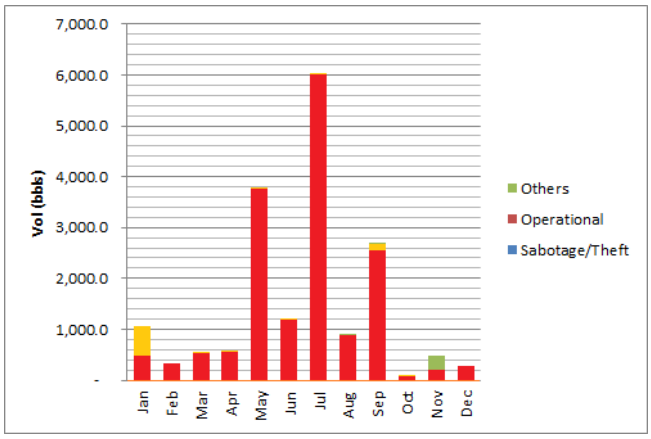
lead to that animal species being endangered. When sea birds are covered in oil slick, they become heavy and may find it difficult to fly. The birds then attempt to clean themselves by eating the oil slicks from their plumage which leads to irritation of their digestive tract, altering their liver function, causing kidney damage and eventually leads to death. Killer whales are also poisoned when they feed on fish that that has swam through the oil. The oil poisons them, and eventually they die. Sometimes, the oil blocks their blowhole (the holes through which they breath) and they die. This has led to killer whales being endangered species. Plankton, larval fish, seaweed, oysters and bottom dwelling organisms are strongly affected by oil spills because sunlight cannot penetrate through the oil slick to the bottom of the ocean and therefore affects producers. When microscopic plants cannot photosynthesize and manufacture their food, they cannot release oxygen for the bottom dwelling aquatic organisms which leads to their death. When these organisms die, fishes cannot feed on them so they die as well, humans that have fish farming as a means of livelihood have their livelihoods denied them and may have to relocate. The biodiversity of a place where a spill has occurred is greatly affected.

Contamination of soil by oil spills adversely affects the germination and growth of plants in soils by creating conditions which make essential nutrients like nitrogen and oxygen needed for plants growth unavailable to them (Samina *et al*., 2002). Over6000 spills had been recorded in the more than 40 years of exploitation in Nigeria, with an average of 150 spills per annum. Between 1976-1996, 647 incidents occurred resulting in the spillage of 2,369,407.04 barrels of crude oil (Adam *et al*., 2002) with only 549,060.38 barrels recovered and 1,820,410.50 barrels of oil lost to the ecosystem (Odu,1991). The environmental consequences of oil pollution on the inhabitants of Rivers state are enormous. Oil spills have degraded most agricultural lands in the state and have turned hitherto productive areas into wastelands. With decreasing soil fertility due to the destruction of soil micro-organisms, and dwindling agricultural proceeds, farmers have been forced to abandon their occupation, to seek non-existent alternative means of livelihood. Aquatic ecosystem has also been affected, causing destruction of traditional fishing grounds leading to exacerbating hunger and poverty in fishing communities. Many authors have reported a lower rate of germination on contaminated soil in their research findings (Vavrek & Campbell, 2002; Achuba, 2006; Smith *et al*., 2006, Korede & Fulekar,2009; Ogbo, 2009). Idu-Ekpeye community in Ahoada west local government area has one of the highest reservoirs of crude oil in Rivers state Nigeria and has experienced oil exploration and exploitation activities for many decades. This Oil exploitation/exploration activities have resulted to diminished agricultural productivity and lack of viable local economies violated the basic human rights of the people, and environmental degradation of the area. These activities have forced the women in the community to abandon agriculture which is their traditional occupation. The youths in Idu-Ekpeye community have engaged in various forms of resistance such as kidnap of oil foreign workers over the past years, demanding a greater share of the community's oil wealth and protesting against environmental degradation to draw attention to oil exploration and exploitation activities in the community. According to Ken Saro-Wiwa, (1987), the relocation of multinational cooperation to countries such as Nigeria, has had detrimental consequences for the local people of the Niger Delta and has not provided them with new economic opportunities and other progressive individual choices.

Monthly oil spill incidents in Niger Delta, Nigeria for2015.Source, SPDC.



Volume of oil spills/month (bbl), 2015.Source: SPDC.



Crude spills in the Niger-Delta area affects plants negatively by creating conditions which makes essential nutrients like nitrogen, oxygen etc needs for plant growth unavailable to them from the affected soil (Abali, 2009). Research findings have shown a sharp decline in the number of farmers in the study area .In the work of Ekpu,(1995) about 50% of the inhabitants were engaged in farming prior to oil spillage, 14.75% in trading while 7.35% were engaged in Artisan works, 8.42% of civil servants, 3.68% public servants; while currently 37.35% of the inhabitants are farmers, 18.42% trading, 12.63% Artisan, 13.68% civil servants, and 4.73% public servants. This shows a decline of development in agricultural activities where

they had comparative advantages over neighboring communities in the local government. The research further showed that about 19.05% of the people in Idu-Ekpeye community developed various gastrointestinal disorder contacted by drinking rain water, water from polluted rivers and streams and the consumption of fish from polluted water bodies; while 19.05% suffered for respiratory ailments such as bronchitis, asthma, cough asphyxiation as well as ocular diseases (Ekpu,1998). Idoniboye, (1992) noted that the disturbance of the ecosystem by pollution leads to poisoning of myriad of food chains that brings about genetic mutation like cancer

Moffat and Linden,(1995) stated that oil-related operations are the most obvious industrial activity in the Nigerian Niger Delta in which Idu ekpeye is located. According to Kontagora, (1991), between 1976 and 1990, a total of 2,796 oil spill incidents were reported by oil companies in Nigeria. An estimated total quantity of 2,105,393 barrels of oil were spilled on land, coastal and offshore marine environments. An understanding of the processes involved and how they interact to alter the nature, composition and behaviour of oil with time is fundamental to all aspects of oil spill response. Phytoremediation is an alternative to more expensive remediation technologies because it is a feasible, effective and non-intrusive technology that utilizes natural plant processes to enhance degradation and removal of oil contaminants from the environment (Ekweozor,1981)

Plate 1: Effect of oil spillage on water.

STUDY AREA

Idu-Ekpeye community of Ahoada west local government area in Rivers State, Nigeria(Fig.1) is located within latitudes 5^0 23N and 5^0 26^1N and longitude of 6^0 33^1 E and 6^0 42^1 North West and has a topography of flat plains in a network of rivers – the *Niger, Sambreiro, Orashi* and other tributaries along a network of creeks. It is one of the onshore oil producing areas of Rivers state and has one of the highest oil and gas production onshore of the Niger Delta with over 800 oil wells, over ten (10) oil fields and playing host to a number of multinational companies (Abali, 2009). This area has a labyrinth of pipelines carrying oil and gas to flow station from different oil wells. Oil and gas activities started in Idu-Ekpeye community in 1964 with actual production commencing in 1966, since then, production activities has been continuous with increase in the number of drilled oil wells(SPDC Annual Report, 2006). Gas flaring and oil spillage due to rupture of pipes have been the major source of environmental pollution in the environment. In terms of population, the community has an estimated number of 25,351 people in the whole community (National Population Commission, 2006). They are great farmers and fishermen with a rich cultural history. Idu-Ekpeye community is the highest populated community in Ahoada West local government area of Rivers state (Fig.2). The geology of the area is of the earlier deposits of the marine sediments of the lower and upper cretaceous age, which constitute the economically important structure, were petroleum was formed and deposited. The soil type could be classified as sandy, loamy, clay etc though urban and industrial developments have reduced the vegetative of the area.

Oil spillage is one of the incidences that occur in Idu-Ekpeye community. For example, in July 2005, the *Ubie* flow station 6 terminal incidents as a result of equipment failure spilled 640,000 barrels of oil into the *Ulagbe* estuary in Idu-Ekpeye community polluting the soil, aquatic environment and surrounding swaps forest (Shell Petroleum Development Company Annual Report, 2012).

Another case of oil spillage was one that occurred at *Onoha* farmland in 1992, as a result of ageing of facilities in Trans-Niger pipeline which was unable to withstand the pressure of oil and lands to spills.

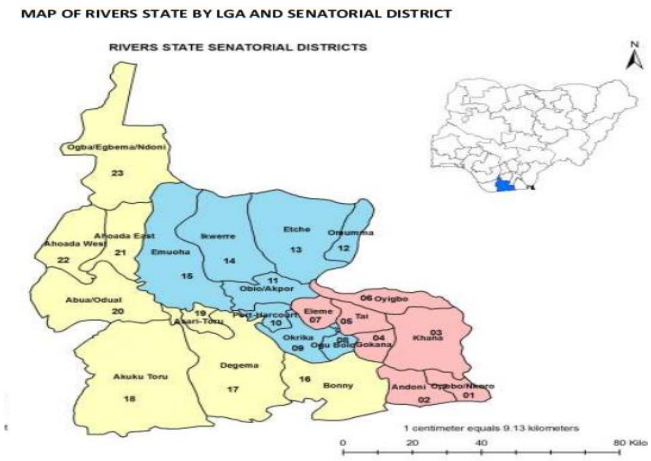


Fig 1: Map of Rivers State Showing LGAs and Senatorial Districts

Source: Rivers State Survey Maps, 2015

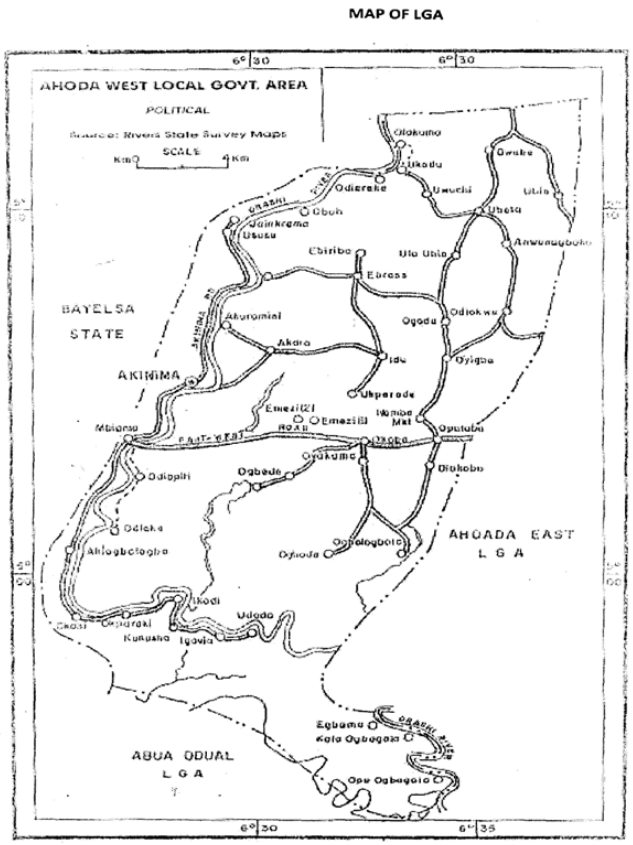


Fig.2: Map of Ahoada West LGA Showing Communities in Idu-Ekpeye

Source: Rivers State Survey Maps, 2010

METHODOLOGY

This work elicited information on the impact of oil spillage on economic, aesthetics and health status of people living within Idu-Ekpeye community by administering 50 structured questionnaires to respondents within the study area . Prior to the questionnaire administration the sample frame and sample size of Idu-Ekpeye community in Ahoada West L.G.A Rivers State, Nigeria was calculated. According National Population Commission (2006) census figure, Idu-Ekpeye has population of 25,351, people in the whole community and the area is projected using population projection formula;

$\mathcal{P}(e + 1) = \mathcal{P}\ (1 + \frac{R}{100})n$

$\mathcal{P}(e + 1) = 25, 351\ (1 + \frac{2.8}{100})n$

$\mathcal{P}(e + 1) = 25, 351\ (1.028)^8$

$\mathcal{P}(e + 1) = 25, 351$ (1. 028 x 1.028 x 1.028 x 1.028 x 1.028 x 1.028 x 1.028 x 1.028) = 1.24722532

$\mathcal{P}(e + 1) = 25, 35, (1.24722532)$

$\mathcal{P}(e + 1) = 25, 35 \times 1.24722532$

$\mathcal{P}(e + 1) = 31618.41$

$\mathcal{P}(e + 1) = 31618$

Therefore, the sample frame is 31618

Based on the sample frame which total the population of 31618 after projection using projection formular the sample size is gotten using Yaro Yamanes formular as shown below;

$n = \frac{N}{1+N\ (e)^2}$

Where n = sample size

N = the study population (sample frame)

E = level of significance

I = constant

$\frac{31618}{6} = 5269.667$

$n = \frac{5269}{1+5269\ (0.5)^2} = 1317$

$n = \frac{5269}{1+1317}$

$n = \frac{5269}{1318} = 3.998$

The administered questionnaires were collected and analyzed using sample descriptive statistics.

Sampling and Analysis

The sample consists of soil contaminated with crude oil, and involved chemical remediation treatment using a degreaser and an ordinary detergent that was prepared according to Whitten *et al*., (1985). Samples were taken at different depths and distances from crude oil on muddy area. The top soil sample was collected at 0- 15cm depth while sub-soil sample at the depth of 15-30cm. The samples were collected in plastic bags and sampling protocols were in line with standard procedures. A fallow farmland was delineated on the run of an oil pipeline from a tank farm at Idu-Ekpeye community on the alluvial wetland of Ahoada West L.G.A, Rivers state Nigeria. Square portions (4m x 4m) were marked out and cleared of vegetation at three plots within the farmland, and they were left to stabilize for three days before treatment. A 3 x 3 randomized block design was overlaid on each block and comprise treatments A, B and C being the control, for the crude oil polluted area and the reclaimed portion respectively. Plot C was located at patches where crude-oil did not pollute.

Degreaser and detergent application: A solution of 1 litre of degreaser (sodium lauryl benzene sulfonate, SO_3Na) mixed with 1 litre of ordinary detergent was poured on the oil-polluted soil and allowed to sit for 2 hours to enable it to break the oil bounds that blocked the micro and macrospores of the soil. This solution saturated spaces that contained viscous hydrocarbons, entrapped air, deposited salt, all of which reduced the percolation of water, air and nutrients by closing up the pores and increasing soil sliding resistance initially. This solution reduced root penetration and anchorage leading to crop depth. Concentric-ring infiltrometers were placed on the polluted soil and the prepared liquid was poured into the inner ring and annulus spaces for proper

infiltration into the polluted soil and to cover the root zone.

Analysis of Measured Parameters

A series of tests were performed to evaluate the effect of crude oil spill on soil characteristics by analyzing some physicochemical varaiable such as; pH, THC, TOC, oil and grease among others. Some methods employed include:

Soil pH: This was measured with a multiprobe meter by adjusting the panel knob on the pH point and dipping the probe directly into water and the reading taken in situ.

Oil and Grease Determination: The soil sample was mixed using a glass rod or spatula. The sample was dried in the oven at about 105^{o}C $\pm$ 2^{o}C for 2 hours. The dried material was disaggregated by gently crushing any lumps in a mortar. About 5.0g of the sample was weighed into a 120ml glass bottle for extraction. About 20ml of the solvent was added into the bottle and extracted in a vibrating bath for three hours, allowed to settle and filtered in a clean bottle. The concentration was determined photogrametrically. To calculate the Oil and grease, 150-200ml clean and dry beaker was obtained and a wet sludge of about 20g acidified droopwise with conc HCl in addition to 25g magnessium sulphate monohydrate was put into it. A plastic rod was used to stir to produce a thin smooth paste, which was spread on the walls of the beaker in order to facilitate its removal subsequently. The set up was allowed to solidify by standing for 20mins. Using the flat end of a spatula, the solid sludge was removed and ground in a pore-clain mortar to form powder. The powder was placed in a paper extraction thimble and glass beads put into the thimble. The grease content was extracted in a soxhlet apparatus using the trichloro-ethane extraction at the rate of 20 cycles per hour for 4hrs.

Any turbid or suspended matter present was removed by filtration through grease-free cotton into a clean and weighed flask which was subsequently rinsed with the solvent. The solvent was distilled from the extraction flask in water at 85^{o}c, dried by placing on a steam bath and air drawn through the flask with a vacuum pump for 15mins and cooled in a desiccators and weighed;

Calculation:

Grease and dry solid = $\frac{increase\ in\ weight\ of\ flask\ (g) x\ 100}{weight\ of\ wet\ sludge\ (g) x\ \%\ dry\ solid}$

Total Organic Carbon (TOC):

The titrimetric method was used for this determination, only that no reflux was carried out. A sample of the sludge or sediments was dried to constant weight. 0.2 to 0.5g of the sample was weighed after grinding some of the fine powder in mortar and put into 500ml conical flask. 10ml K_2Cr2O_7 was added and swirled gently. 20ml concentrated H_2SO_4 was added rapidly but avoiding splashing and directing the acid into the suspension, swirled gently until the reagents were mixed and the flask allowed to stand for 30mins.200ml distilled water was added and then 10ml concentrated H_3PO_4 cautiously to avoid splashing . 3 – 4 drops of ferrion indicator solution was added and titrated. At end point the colour changed from blue to deep-green.

Calculation: Mg TOC/g sample = $\frac{(V_b - V_s)\ \text{x}\ M\ \text{x}\ 16{,}000}{wt.of\ sample\ in\ g}$

% TOC = $\frac{(V_b - V_s)\ \text{x}\ M\ \text{x}\ 1.38}{wt.of\ sample\ in\ g}$

Sulphate: The soil was extracted with water at a soil-water ratio of 1:5 and the soil-water mixture was heated on a hot plate for 30mins. The sieved extracted sulphate was then allowed to react with sulphate reagent to form an insoluble barium salt which produces turbidity in the test sample. The degree of turbidity is proportional to the sulphate level in the soil sample and was determined using multi-parameter photometer.

Phosphate: Phosphate was extracted using 0.5ml of sodium bicarbonate at soil/water ratio of 1:25. The extracted phosphate reacted with sulphate reagents/ammonium molybdate under reducing conditions in acidic solution to form a blue coloured complex. The intensity of the blue colouration is proportional to the phosphate level in the soil . The phosphate in the sample was determined using multi-parameter photometer.

Magnesium (mg) Extraction: It was extracted using 1m potassium chloride at a soil-water ratio of 1:5. The extracted and exchanged magnesium then reacted to form an orange complex. The reagents produced a yellow colour in the absence of magnesium. The intensity of the orange colour produced is proportional to the magnesium level in the soil.

Heavy Metals Determination: A measured quantity of the sample was transferred into a Kjeldahl flask; 20ml of concentrated nitric acid (HNO_3) was added and the sample pre-digested by heating gently for 20mins. More acid was thereafter added and digestion continued for 30-40mins. Digestion was stopped when a clear digest was obtained. The flask was cooled and the content transferred into a 50ml volumetric flask and made to the mark with distilled water. The resulting solution was analyzed for heavy metals using the Atomic Absorption Spectrophtometer (AAS).

RESULTS AND DISCUSSIONS

Tables 1-3 showed the results of respondents answers from the administered questionnaires during the survey. Table 1 showed the impact of oil spillage on means of livelihood, table 2 showed the impact of oil spillage on crop yield while table 3 showed the health effect of oil spillage. Table 4 showed the results of the physicochemical analysis of crude oil soil samples.

Table 1: Impact of oil spillage on means of livelihood

Occupation	Prior to oil spillage %	Current% due to spillage
Farming	190 (50%)	142 (37.35%)
Trading	56 (14.73%)	70 (18.42%)
Artisan	28 (7.37%)	48 (12.63%)
Civil servants	32 (8.42%)	52 (13.68%)
Public servants	14 (3.68%)	18 (4.73%)
Others	60 (15.79%)	50 (13.15%)
Total	380 (100%)	380 (100%)

Table one shows that 50% of the inhabitants were engaged in farming prior to oil spillage, 14.73% in trading while 7.37% were engaged in Artisan, 8.42% civil servants, 3.68% public servants, while currently 37.35% of the inhabitants are farmers, 18.42% trading, 12.63% Artisan, 13.68% civil servants, and 4.73% public servants. Farming, fishing and hunting which were the basic occupation of the people of Idu-Ekpeye community in Ahoada West L.G.A Rivers State have been partially abandoned as a result of dispossession of their land caused by oil spill. Farming activities have been seriously affected and because of the dispossession and despoliation of the soil ecology, there is a shift in the occupation of the people who now combine farming with other professions to eke out a living. As a result of oil spillage, hunting and fishing have also been combined with other menial jobs as most of the forests have been stripped of their natural resources (plants depleted and animal's migrated to different ecological zones). Equally, the people cannot fish effectively because water bodies have been polluted which do not support aquatic lives.

Table 2: Impact of oil spillage on crop yield

Measures	No. of respondents	Percentages (%)
Reduced crop yield	30	60.00 %
Ignorant	20	40.00%
Total	50	100 %

Table 2 showed that 60.00% of the inhabitants responded that oil spillage and acidity in the soil reduced crop yield while 40.00% of the respondents were ignorant of the consequences of oil spillage.

Plate 2: Impact of oil spillage on land

Table 3: Health effect of oil spillage

Disease	No of respondents infected	Percentages (%)
Fever	160	42.10 %
Gastro-enteritis	100	26.33 %
Respiratory disorder	80	21.05 %
Cancer	20	5.26 %
Death	20	5.26 %
Total	380	100 %

Table 3 showed that 42.10% of the inhabitants responded that oil spillage impacted immensely on the lives of inhabitants within the community reporting that they were affected by fever due to the heat generated from gas flare and pollution of the environment including their water. 26.33% of the inhabitants indicated that they suffered from various gastro-enteric disorders contacted by drinking water from polluted rivers and streams or the consumption of fish from polluted water bodies. Another 19.05% complained that they suffered from various respiratory ailments such as bronchitis, asthma and cough asphyxiation. Cancer diseases and death accounted for 5.26%.

Table 4:

S/N	PARAMETER	WHO STANDARD	CONTROL SITE (B)	SPILL SITE (A)
1	Temperature	20-30	30.7	30.9
2	pH	6.5-8.5	6.0	6.3
3	Conductivity µS/CM	100	307	192
4	Nitrate (NO_3), Mg/kg	20	129.0	59.6
5	Nitrate-Nitrogen, Mg/kg	-	29.1	13.50
6	Phosphate (PO^3_4), Mg/kg	>100	12.9	9.8
7	Phosphorus (P), Mg/kg	-	4.2	3.2
8	Phosphate (P_2O_5), Mg/kg	-	9.6	7.3
9	Ammonia (NH_3), Mg/kg	-	4.50	3.30
10	Ammonia (NH_4^+), Mg/kg	-	4.70	3.50
11	Ammonia, Mg/kg	-	3.70	2.71
12	Sulphate (SO_4^2), Mg/kg	100	15	10
13	Chromium, Mg/kg	0.05	0.236	0.316
14	Calcium, Mg/kg	250	48.841	48.112
15	Magnesium, Mg/kg	100	18.571	18.358
16	Sodium, Mg/kg	-	0.529	10.000
17	Potassium, Mg/kg	> 100	0.303	0.562
18	Iron, Mg/kg	1.0	13.554	18.031
19	Aluminum, Mg/kg	-	10.858	25.202

20	Lead, Mg/kg	0.5	0.00	0.00
21	Arsenic, Mg/kg	-	0.00	0.00
22	Cadmium, Mg/kg	0.005	0.243	1.256
23	Total organic carbon, %	-	13191.67662	164405.427
24	Total hydrocarbon, μg/g	10	0.016	1.333
25	Oil and grease, %	1.0	1.3	7.6

Table 4 above showed the effects of oil spill on the physicochemical variables in the study area, *Ubie* oil field (Idu-Ekpeye) operated by the Shell Petroleum Development Company Of Nigeria Limited (S.P.D.C). pH range of 6.0-6.3 is acidic. pH affects plant growth primarily through its effects on nutrient availability. High or low pH cause deficiencies in essential nutrients that plants need to grow. Soil pH affects the behavior of soil microbes, encouraging or inhibiting the growth of pathogens and affecting how well helpful microbes are able to break down organic materials, freeing the nutrients it contains for plant use, (Banet, 2002). Acidic soil often causes the stunting and yellowing of leaves, resulting in the decrease in growth and yield of crops as the pH levels fall. Additionally, plants grown in adverse pH conditions may be more prone to disease and fungal attack. This result showed that Idu-Ekpeye as a community is drastically polluted by oil spillage that thwarted plant development and affected agricultural yield. Conductivity exceeded the standard limits at control and spill points. This is an indication of the presence of substantial amounts of ionic substances, salts in the area. The levels of chromium, sodium, potassium ,iron ,aluminum, cadmium, total organic carbon, total hydrocarbons and oil and grease were higher at the spill site than at the control point. Chromium is widely distributed in soils and vegetation although the concentrations are generally very low(0.05-0.5ppm for plant materials,10-200ppm for soils).It is more toxic to animals than plants(RSMENR,2002).Cadmium contents of non polluted areas are usually below 1 ppm and concern about the levels present in the environment arises because it is a cumulative poison. Oil and grease recorded a higher level in the spilled site than the control.0il and grease is a measure of a variety of substances including fuels, motor oil ,lubricating oil, hydraulic oil, cooking oil, and animal derived fats(stormwater,2016).Sources of oil and grease are mainly anthropogenic(EPA,2010).Oil and grease measured within a waterbody of water can reduce aquatic organisms ability to reproduce and survive(Stenstrom).Total organic carbon is a measure of all organic compounds, unlike oil and grease in that only the mass of carbon is expressed(USEPA,2010).The level is higher in the spilled site than the control site. Iron and Aluminium levels were higher in spilled site than in the control. Dissolved Aluminium is toxic to plants as it affects roots and prevents nutrient intake. High aluminium intake is associated with vitamin deficiencies, nerve damage and cancer(Lenntech,2010).Iron levels is higher in the spilled location than in the control. Iron deficiencies can occur due to its low solubility in alkaline soils and also in phosphate fixation. Although Iron is an essential mineral, diseases of aging such as Alzheimer's disease, neurodegenerative diseases, arteriosclerosis, diabetes mellitus have been linked to excess iron intake(Brewer,2009).Excess iron in drinking water can produce an unpleasant taste and stain home fixtures(Illinois 1992).Iron toxicity has been observed in certain fish species at concentrations of 1.380 mg iron/kg diet(National Research,1993).

Conclusion and Recommendation

The research findings has shown the negative impact of oil spillage activities in Idu-Ekpeye community in terms of social, economic and health cost on the people.It is therefore recommended that Shell Petroleum Development Company(SPDC) operating in this community be encouraged to give employment opportunities to indigenes to reduce the level of crime and social ills caused by unemployment.Social responsibility efforts such as establishing skill acquisition center should be set up to educate and train the youths for self-employment; well equipped health care units should be built in Idu-Ekpeye community to monitor and control the health hazards caused by oil pollution. Moreso, there should also be improved compensation scheme for oil spills and other damages to reflect the ever changing economic conditions obtainable in the present Nigeria. Oil spill sites should be remedied promptly and effectively in addition to constant monitoring of the entire environment.

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