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OIL SPILLAGE AND ENVIRONMENTAL DEGRADATION IN NIGER DELTA: EFFECTS ON LIVELIHOOD OF THE HOST COMMUNITIES

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ABSTRACT:

Despite the benefits of oil exploration, oil pollution caused by spillages from the oil industry located primarily in the Niger Delta region has caused the massive destruction to farmlands, sources of drinking water, mangrove forest, fishing grounds and declination of fish, crabs, mollusks, periwinkles and birds. This study evaluates the effect of oil spillage and environmental degradation in the Niger Delta in Nigeria. The specific objectives are to ascertain the effect of environmental degradation on the livelihood of people of Niger Delta region of Nigeria. And to ascertain the effects of oil spillage on the livelihood of people of Niger Delta region of Nigeria. Ex-post facto research design was adopted for this study. This study relied on secondary data extracts from Nigerian Nationap Petroleum Corporation, World Bank Reports, National Buraeu of Statistics, United Nations Environmental Protection Programme for the years 1978 – 1996 being the period that the incidence of oil spillage in Nigeria was at its peak. The data obtained were analyzed using descriptive statistics and multiple regression analysis was used to test the formulated hypotheses computed with the aid of Stata12 statistical software. The study revealed no significant effect of environmental degradation on the livelihood of people of Niger Delta region of Nigeria. Also, it revealed there is a significant effect of oil spillage on the livelihood of people of Niger Delta region of Nigeria. The study recommended that based on the consequences of oil companies' activities in the region, an integrated approach which is a combination of several development strategies should be employed. That is the establishment of community based integrated approach that needs joint committed efforts from the government and the multinational companies as well as other stakeholders. Also, updating and revising the legislations, reviewing the license of the oil companies and reviewing the fines will go a long way in ensuring compliance, even though the government cannot systematically or frequently monitor these sites.

1. INTRODUCTION

The Niger-Delta area of Nigeria coincides approximately to the south-south geopolitical zone of the country. The region is the most blessed deltas in the world, in both human and material resources but the unfavorable manner in which these resources are harnessed overtime, is the bane of the region's predicament. This exploration and exploitation have continued resulting into what is termed environmental destruction due to neglect and less concern of the multinational companies in environmental management in the area (Badejo, 2014). The environmental degradation resulting from oil and gas production in the Niger-Delta has attracted the attention of environmentalists and other experts, who look at the region within the larger context of globalization (UNDP Report, 2006). 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 Goal is to ensure environmental sustainability. It then implies that there should be reduction in environmental degradation. Oil spillage is a global issue that has been occurring since the discovery of crude oil, which was part of the industrial revolution. The degradation of the environment is the depletion of the natural environment mostly through the activities of humans (Ogboru & Anga, 2015).

The Niger Delta consist of diverse ecosystems of mangrove swamps, fresh water swamps, rain forest and is the largest wetland in Africa and among the ten most important wetland and marine ecosystems in the world, but due to oil pollution the area is now characterized by contaminated streams and rivers, forest destruction and biodiversity loss in general the area is an ecological wasteland. This affects the livelihood of the indigenous people who depend on the ecosystem services for survival leading to increased poverty and displacement of people. Environmental security deals with environmental issues which threatens environmental security. However, while it is not the case that all environmental events can be said to be capable of threatening human security, such issues as climate change, deforestation and loss of biodiversity have been found to be capable of threatening human security. The United Nations has identified environmental degradation as one of six clustered threats with which the world must be concerned now and decades ahead (UNO, 2004). Environmental degradation is the disintegration or the deterioration of the environment through the depletion of resources such as air, water and soil, the destruction of ecosystems, habitats destruction, the extinction of wildlife and pollution. The United Nations International Strategy for Disaster Reduction (ISDR) defined environmental degradation as the reduction of the capacity of the environment to meet social and ecological objectives and needs (ISDR, 2004). Therefore, until the critical moment in earth's history, these were some of the challenges to peace as well as sources of

conflict that threatened humanity. But, the now-discovered impact of the degradation of the ecosystem was not only a credible and serious threat to peace; it also represented a source of conflicts for humanity and, indeed a potent global threat to all life on earth (Bakut, 2006).

Most studies regarding the connection between oil related environmental problems and the impact on the region have not really done extensive work on the link between the economic effects and the resulting social effects. This is because there are numerous economic and social effects resulting from the former. Most of the studies in isolation examined either economic or social effects. So, this study seeks to fill this gap by examining the various economic effects and its predictive contribution in explaining its social effects in the region. This study therefore aims at the various environmental problems associated with oil exploration and spillage in the Niger Delta, Nigeria. It equally brings into perspective, the environmental impact occurring in an important, reproductive wet land and marine ecosystem even as It hopes to enlighten and sensitize relevant authorities on the problem within the Niger Delta region of Nigeria, presenting recommendations arising from the study which will help policy makers on future plans.

1.1 Objectives of the Study

The general objective of the study is to ascertain the effect of oil spillage and environmental degradation in Niger Delta on the livelihood of the host communities. Specifically, the study seeks to:

The specific objectives of the study are to:

i. ascertain the effect of environmental degradation on the livelihood of people of Niger Delta region of Nigeria.

ii. ascertain the extent to which oil spillage affects the livelihood of people of Niger Delta region of Nigeria.

1.2 Hypotheses

H_{01}: There is no significant effect of environmental degradation on the livelihood of people of Niger Delta region of Nigeria.

H_{02}: Oil spillage has no significant effect on the livelihood of people of Niger Delta region of Nigeria.

2. LITERATURE REVIEW

2.1 Conceptual review

2.1.1 Niger Delta Region: Background

Nigeria has a coastal line of approximately 85km towards the Atlantic Ocean lying between latitude 134°15' to 4°50' and longitude 5°25' to 7°37' with a land mass of about 28000sq/km area within the coastal region. The surface area of the continental shelf is 46300sq/km. The coastal areas consist of freshwater swamp, mangrove swamp, beach ridges, sand bars, lagoons marshes and tidal channels. Nigeria has a total land mass of 923,768sq/km; 918,768sq/km being terrestrial land and 13000 sq. /km being aquatic (CIA World Fact Book). The coastal area is humid with a mean average temperature of 24-32°C and coastal area has an average annual rainfall ranging between 1,500-4,000m (Kuruk, 2004). Nigeria has two large rivers; the Niger-Benue and the Chad River. There are several rivers that channel into the Atlantic Ocean directly, all other flowing waters flow into the Chad basin or into the lower Niger to the sea eventually (Kuruk, 2004).

The Niger Delta is located in the Atlantic coast of Southern Nigeria and is the world's second largest delta with a coastline of about 450km which ends at Imo river entrance (Awosika, 1995). The region is about 20,000sq/km as it is the largest wetland in Africa and among the third largest in the world (Powell et al., 1985; CLO, 2002; Anifowose, 2008; Chinweze & Abiola- Oloke, 2009). Accordingly, 2,370sq/km of the Niger Delta area consists of rivers, creeks, estuaries and stagnant swamps cover approximately 8600sq/km, the Delta mangrove swamp spans about 1900sq/km as the largest mangrove swamp in Africa (Awosika, 1995). The Niger Delta is classified as a tropical rainforest with ecosystems comprising of diverse species of flora and fauna both aquatic and terrestrial species. The region can be classified into four ecological zones; coastal inland zone, freshwater zone, lowland rainforest zone, mangrove swamp zone and this region is considered one of the ten most important wetlands and marine ecosystems in the world (FME et al., 2006; ANEEJ, 2004). As of 1991, the National Census estimated about 25% of the entire Nigerian population lives within the Niger Delta region (Twumasi & Merem, 2006; Uyigue & Agho, 2007). The Niger Delta region has a steady growing population of approximately 30 million people as of 2005, accounting for more than 23% of Nigeria's total population (Twumasi & Merem, 2006; Uyigue & Agho, 2007).

2.2 Oil Spillages

An estimated 9 million- 13 million (1.5 million tons) of oil has been spilled in to the Niger Delta ecosystem over the past 50 years; 50 times the estimated volume spilled in Exxon Valdez oil spill in Alaska 1989 (FME, NCF, WWF UK, CEESP-IUCN 2006). The first oil spill in Nigeria was at

Araromi in the present Ondo state in 1908 (Tolulope, 2004). The Punch Newspaper on February 20, 1991:2 reported a total of 2,796 oil spill incidences recorded between the periods of 1976-1990 leading to 2,105,393 barrels of oil spilled. The UNDP 2006:181 also reported that between the period of 1976-2001, 3 million barrels of oil were lost in 6,817 oil spill incidences of which over 70% of the spilt oil was not recovered. In 2001 the western operations of the Shell Petroleum Development Company (SPDC) recorded a total of 115 incidences of oil spills in which 5,187.14 barrels of oil were spilled and 734,053 barrels of the spilt oil representing 14.2% were recovered (SPDC Nigeria Brief, May 1995). In January 1998, 40,000 barrels of crude oil was spilled by Mobil in Eket but the largest spill in Nigeria was the offshore well blowout in January 1980 with a spill of approximately 2000 barrels of oil into the Atlantic Ocean from an oil facility which damaged 340 hectares of mangrove forest (Nwilo & Badejo, 2005b).

Table 1 below gives the number of oil spills into the marine environment reported between the periods of 1997-2001. The Niger Delta has a complex and extensive system of pipelines running across the region and large amounts of oil spill incidences have occurred through the pipelines and storage facility failures, these failures could be caused by material defect, pipeline corrosion, ground erosion but the oil companies blame most of the spills on sabotage. The Department of Petroleum Resources contends that 88% of the oil spill incidences are traceable to equipment failure, main causes of oil spills in the Niger Delta are vandalism, oil blowouts from the flow stations, accidental and deliberate releases and oil tankers at sea (Nwilo & Badejo, 2004, 2005a).

Table 1. Some Severely Oil Polluted Sites in the Niger Delta

Location	Environment	Impacted Area	Nature of Incidence
Bayelsa State			
Biseni	Freshwater Swamp Forest	20	Oil Spillage
Etiama/Nembe	Freshwater Swamp Forest	20	Oil Spillage & Fire
Table 1. Some Severely Oil Polluted Sites in the Niger Delta Continued			
Peremabiri	Freshwater Swamp Forest	30	Oil Spill Incidence
Adebawa	Freshwater Swamp Forest	10	Oil Spill Incidence
Diebu	Freshwater Swamp Forest	20	Oil Spill Incidence
Tebidaba	Freshwater Swamp Forest	30	Oil Spill Incidence
Nembe creek	Mangrove Forest	10	Oil Spill Incidence
Azuzuama	Mangrove	50	Oil Spill Incidence
9 sites			

Source: FME, NCF, WWF UK, CEEP-IUCN 2006

Table 1. Some Severely Oil Polluted Sites in the Niger Delta Continued

Delta State			
Opuekebe	Barrier Forest Island	50	Salt Water Intrusion
Jones Creek	Mangrove Forest	35	Spillage & Burning
Ugbeji	Mangrove	2	Refinery Waste
Ughelli	Freshwater Swamp Forest	10	Oil Spillage-Well head
Jesse	Freshwater Swamp Forest	8	Product leak/Burning
Ajato	Mangrove		Oil Spillage Incidence
Ajala	Freshwater Swamp Forest		Oil Spillage Incidence
Uzere	Freshwater Swamp Forest		Oil Spillage Incidence
Afiesere	Freshwater Swamp Forest		Oil Spillage Incidence
Kwale	Freshwater Swamp Forest		Oil Spillage Incidence
Olomoro	Freshwater Swamp Forest		QC
Ughelll	Freshwater Swamp Forest		Oil Spillage Incidence
Ekakpare	Freshwater Swamp Forest		Oil Spillage Incidence
Ughuvwughe	Freshwater Swamp Forest		Oil Spillage Incidence
Ekerejegbe	Freshwater Swamp Forest		Oil Spillage Incidence
Ozoro	Freshwater Swamp Forest		Oil Spillage Incidence
Odimodi	Mangrove Forest		Oil Spillage Incidence
Ogulagha	Mangrove Forest		Oil Spillage Incidence
Otorogu	Mangrove Forest		Oil Spillage Incidence
Macraba	Mangrove Forest		Oil Spillage Incidence
20 sites			Oil Spillage Incidence
Rivers State			
Rumuokwurusi	Freshwater Swamp	20	Oil Spillage
Rukpoku	Freshwater Swamp	10	Oil Spillage

Source: FME, NCF, WWF UK, CEEP-IUCN 2006 Niger Delta Resource Damage Assessment and Restoration Project.

2.3. General Environmental effect of Oil Spillage on Mangroves

Damage to mangrove forests varies with the amount and toxicity of the spilled oil product. The degree of impact is a function of oil type, spill volume, duration or re-oiling, extent of oil coverage on exposed roots, degree of substrate oiling (NRC, 2003). Light oils are acutely toxic while heavier oil can lead to eventual death by smothering. Black mangroves are the most sensitive because they osmo-regulate by passing material through the roots and vascular system and then out of the leaves through specialized glands on the leaf surface. When black mangroves are oiled this osmoregulatory process aids oil uptake (Getter *et al.*, 1985). The Niger Delta is highly susceptible to adverse environmental changes occasioned by climate changes because it is located in the coastal region of the world (Uyigue & Agho, 2007). The area is environmentally rich it consists of primarily mangrove swamp with areas of fresh water swamp and rainforest (Odeyemi & Ogunseitan, 1985). It

has a network of streams and tributaries interlinking, the rivers are the main source of portable water for many towns and villages (Tolulope, 2004). Many species of plants and animals within the mangrove forest have become endangered or at the verge of extinction. Lewis (1981) proposed a generalized response stage of oil mangroves based on his experience at spills in Florida (T/V Howard Star) and Puerto Rico (T/V Zoe Colocotronic). Lamparelli, *et al.*, 1997 conducted a nine-year research on crude oil spill site along a tidal channel in Brazil as shown below in Table 2

Table 2: Proposed Stages of Impact and Recovery of Oiled Mangroves

Percentage	**Author**	**Stage/Phase**	**Response**
0.6	Lewis,	Acute	
0		0-15 days	Death of birds, turtles, fish, and invertebrates
4.3		10-30 days	Defoliation and death of small (<1 m) mangroves; loss of aerial root community
5		Chronic	
		30 days-1year	Defoliation and death of medium (<3m) mangroves, tissues damage to aerial roots
76		1 -5 years	Death of larger (>3m) mangroves; loss of oiled aerial roots and regrowth of new ones (sometimes
21		1-10 years	Reduction in litter fall, reduces reproduction, and reduced survival of seedlings; death or reduced growth of young trees colonizing oiled sites? Increased insect
20		10-15 years	Complete recovery
19	Lamparell	Initial Effect	
18		0-1 year	Seedling and saplings die; no structural alterations can be measured
4.8		Structural	
		1 -4 years	High mortility is observed, and the oil impact can be measured in terms of major structural alterations
		4-9 years	No or few additional alterations to the structural parameters; sapling growth is observed Recovery
		> 9 years	It is possible to measure improvements in the structural tree parameters; ecosystem may not recover

Source: NRC, 2003

Wetlands naturally have the ability to break down and assimilate pollutants, which is a resource applicable to the Niger Delta region. The forest cover within the region serves as a climate control, which regulates local climate at macro and micro levels. The canopies within the water catchment

areas maintain hydrological cycles and soil stabilization, which prevents erosion and are important in watershed regulations (Chinweze & Abiola-Oloke, 2009). The clearing of vegetation within the region has many adverse effects such as: salination of water table, declination of water quality, adds silt to the marine ecosystem due to mangrove clearing. A lot of plants found within the region are used for medicine and insect repellent. Also, raw material used by many industries in Nigeria such as: starch, ink, rubber, gums, fibres are found within the region.

2.3. Environmental Degradation in the Niger Delta and its Effect on the People

In terms of environmental changes occurring within the region, large areas of mangrove forest have been destroyed which is a major source of wood to the indigenous people. When oil spills occur, the oil spreads over a wide area affecting terrestrial and marine resources. Some past spills have necessitated the complete relocation of some communities, loss of ancestral homes, pollution of fresh water, loss of forest and agricultural land, destruction of fishing grounds and reduction of fish population, which is the major source of income for the Niger Delta people. Which all constitute massive unquantifiable losses to farmers, fishermen and hunters (Ukoli, 2005). The pollution exposes people also to new risk of diseases.

A study by Twumasi and Merem (2006) about the Niger Delta forest area made assessments using Geo spatial Data processing and Analysis; Two Landsat Thematic Mapper I and Enhanced Thematic Mapper plus (ETM+) images, the analysis was for the period 1985-2005. The results showed a slight decline in water bodies from 343,654 to 343,513 hectares, mangrove and closed forest showed a decline from an initial estimate of 55,410 hectares in 1985 tom 37,117 hectares and closed forest from 250,161 hectares in 1985 to 175,609 hectares, the results of the study is shown below in Table 3.

Table 3: Decline of Mangrove and Closed Forest in the Niger Delta

Classes	**Area (ha) in**	**Area (ha) in 2000**	**% Change (1985-2000)**
Water	343,654	343,513	-0.04
Crop land	16,495	23,974	45.34
Settlement/bare areas	52,738	108,725	106.16
Mangrove	55,410	37,117	-33.01
Closed forest	250,161	175,609	-29.8
Mixed forest	162,916	192,436	18.12

Source: Twumasi and Merem, 2006

2.2 Theoretical Review

2.2.1 Legitimacy Theory

The theoretical framework of this study is anchored on the legitimacy theory. The proponents of the legitimacy theory are Dowling and Pfeffer (1975). This theory is derived from the concept of organizational legitimacy which entails a condition or status which exists when an entity's value system is congruent with the value system of the larger social system of which the entity is a part. Legitimacy theory is essentially a system-oriented theory, in which an organization or company is seen as one component of a larger social environment. It can be used as a vehicle to construct a corporate strategy, especially about efforts to position themselves in the midst of increasingly advanced community environments. Thus, legitimacy is a potential benefit or resource for a company to survive (going concern). This implies that legitimacy is a company management system oriented towards alignment with the community (society), the Government, individuals, and community groups.

Also, this theory gives an insight to management on how to build a framework that will be responsive to the concerns of stakeholders who are being affected by unprecedented levels of environmental issues and change. For these reasons, this study adopts legitimacy theory as the theoretical perspective for the purpose of explaining the effect oil spillage and environmental degradation in Niger Delta.

2.3 Empirical Review

Anyanwu and Ejem (2020) examined the variables of maritime-induced oil spillage in Niger delta region of Nigeria. Research data were collected from National Oil Spill Detection and Response Agency (NOSDRA), and Nigerian Maritime Administration and Safety Agency (NIMASA) and analyzed using statistical software. The analysis showed that oil theft has significant relationship with the total number of spill incidents in the Nigerian coastal waters, as against the other independent variables (mechanical failure, marine pipeline leakage and shipping activities) tested, but was found not to contribute significantly to spill incidents in the Niger Delta Region. Oil theft variable has significant impact on spill incidence occurrence in the Nigerian coastal waters. Mechanical failure, marine pipeline leakage and shipping activities has no significant impact on the number of spill incident occurrences in the Nigerian coastal waters.

Oriavwote and Oyovwi (2019) examined the economic implications of environmental degradation in Nigeria. The Ordinary Least Squares and Granger Causality were used to analyze the data. The

result indicates that per capita income has a positive and insignificant relationship with carbon emission. An indication of the absence of the EKC. The square of the per capita income has a positive and insignificant relationship with carbon emission. A further confirmation of the absence of the EKC in Nigeria. The result of the granger causality test indicated no causal relationship between carbon emission and per capita income. The study recommended an increase in per capita income that is not followed by a rise in inflation rate as well as strong regulatory measures.

Bessong *et al.* (2019) examined the effect of oil spillage cost on profitability of oil companies in Nigeria. The ex-port facto research design was utilized in the study. Panel regression was also adopted to estimate the effect of oil spillage on the profitability of the oil companies. The result of the model is mixed while the relationship between oil spillage cost (LNOSC) and profitability is significant but positive contrary to theoretical expectations. Similarly, the effect of clean-up cost (LNCUC) on profit is significant and negative in line with apriori expectation. The result of LNCUC versus profit showed that clean-up cost leads to reduction on the profit of oil companies. The study recommended that oil firms should pay close attention to the issue of oil spillage to ensure that the incident is reduced drastically, oil company should also provide adequate security over oil installations and facilities to obviate vandalism and mitigate incidences of oil spillage.

Olaitari (2015) examined the environmental impact of oil spillage and degradation in the Niger delta region of Nigeria. The causes, consequences, solutions to the problem of oil spill incidents and remediation measures were articulated to ameliorate this problem and assist oil communities. It was concluded with few suggestions made; that the Nigerian Agip Oil Company should direct to improve on the management of waste at the terminal especially (the waste sludge etc) that enters the canal. The containment equipments within the canal should be improved in order to properly contain the oil within the canal and adequate compensation should be paid to the affected communities.

Osuagwu and Olaifa (2018) examined the effects of oil spills on fish production in the Niger Delta of Nigeria from 1981-2015 using an estimable model based on a Cobb Douglas production function. The variables included in the model are captured fish production, number of fishers, loan to fishery, oil spills and oil production. The findings suggested that oil spill and oil production negatively affects fish production, while farm labour has a positive effect on fish production. On the other hand, fishery loan exerts a negative effect on fish production and this could be ascribed to the bottlenecks in trying to access these loans. The Pairwise Granger

Causality test result shows that the number of times oil is spilled to the environment affects the level of fish production negatively.

Kadafa (2012) investigate the various environmental problems associated with oil exploration and spillage in specifically the Niger Delta in Nigeria, as well as bring into perspective the environmental impact occurring in an important, reproductive wetland and marine ecosystem. Secondary data was used and analyzed using descriptive method. The study discovers that the oil pollution caused by spillages from the oil industry located primarily in the Niger Delta region has caused the massive destruction to farmlands, sources of drinking water, mangrove forest, fishing grounds and declination of fish, crabs, mollusks, periwinkles and birds.

Eregha and Irughe (2009) examines the oil related environmental degradation in the Nigeria's Niger-Delta and the emerging socio-economic multiplier effects on the people of the region. The study employed tables and charts as well as percentages forms of statistical analysis. Data for the study were mainly secondary sources extracted from the National Bureau of Statistics (NBS) and the United Nations Development Programmes report. The study revealed that the emerging social disorder and HIV/AIDS prevalence in the region is as a result of the economic multiplier effects such as unemployment and high level of poverty. The study then recommends an integrated community-based approach involving commitment from all stakeholders.

Opukri and Ibaba (2008) in their study on oil induced environmental degradation in the region and conclude that it results into internal population displacement. They adopted descriptive survey method of analysis using secondary data but it reflected only on one of the social effects of these activities on the people of Niger-Delta.

Aluko (2004) in his study on environmental degradation and its impact on the Niger-Delta region used primary data sourced from thirteen communities in the area employed descriptive analysis. He concludes that oil exploration activities in the region leading to environmental degradation are responsible for the high degree of poverty in the area. This study was based on one of the economic effects of environmental degradation.

Gabriel (2007) in his study on environmental issues and challenges in the Niger-Delta focuses on its impact on women economic activities in the area. He employed a theoretical approach to highlight the emerging effects of the environmental hazards on the region and concluded that it has adverse

effects on women activities. This also has not discussed the effects from the socio-economic point of view comprehensively but only an aspect of economic effects.

3. MATERIAL AND METHOD

Ex-post facto research design was adopted for this study. This study relied on secondary data that was obtained from the Nigerian National Petroleum Cooperation, World Bank Reports, National Bureau of Statistics, United Nations Environmental Protection Programme, Books, Newspapers, Conference and Seminar Papers, Journals and the internet for the years 1978 – 1996, being the period that the incidence of oil spillage in Nigeria was at its peak.The data obtained was analyzed using descriptive statistics and multiple regression analysis was used to test the formulated hypotheses computed with the aid of Stata12 statistical software.

4. RESULT AND DISCUSSIONS

4.1 Data Analysis

4.1.1 Descriptive Statistical Analysis of the Data

Table 4: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
edrg	21	88615.61	170670.8	3803	630635.9
osp	21	230.2381	112.4371	104	495
hdi	21	1.324286	1.659917	.1	5.33

Source: Output from STATA version 12

EDRG= Environmental degradation, OSP= Oil spillage, HDI=Human development index

The Table 4 above shows that the average mean of environmental degradation (edrg) generated is 88,615.61 million with a minimum of 3803 and maximum of 630,636 million, and a standard deviation of 170670. This shows the extent of environmental degradation within the Niger Delta region. Table 4 above also shows that the average mean of oil spillage (osp) generated by the sample firms is 230.24 with a minimum of 104 and maximum of 495 and a standard deviation of 112. Furthermore, table 4 showed that the average mean of human development index (hdi) is 1.3 with a standard deviation of 1.66 and a minimum of 0.1 and maximum of 5.33. This shows the poor standard of living with the Nigeria delta region.

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Table 5: Test of Multi-Collinearity

Variable	VIF	1/VIF
edrg	1.01	0.992352
osp	1.01	0.992352
Mean VIF	1.01	

Source: Output from STATA version 12

In Table 5 above on the test of multicollinearity among the independent variables, it revealed that the variance inflation factor value is well below 10. Therefore, independent variables used in this study do not suggest multicollinearity problem.

4.2 Test of Hypotheses

Table 6: Regression Result on $HDI_{it} = \alpha_0 + \alpha_1 EDRG_{it} + \alpha_2 OSP_{it} + \varepsilon_{it}$

Source	SS	df	MS		
Model	19.8209486	2	9.91047431	Number of obs	= 21
Residual	35.2855646	18	1.96030914	F(2, 18)	= 5.06
Total	55.1065132	20	2.75532566	Prob > F	= 0.0181
				R-squared	= 0.3597
				Adj R-squared	= 0.2885
				Root MSE	= 1.4001

hdi	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
edrg	-1.18e-06	1.84e-06	-0.64	0.528	-5.05e-06	2.68e-06
osp	.0085139	.0027951	3.05	0.007	.0026415	.0143863
_cons	-.5310179	.7433029	-0.71	0.484	-2.092639	1.030603

Source: Output from STATA version 12

4.2.1 Hypothesis One

H_o: There is no significant effect of environmental degradation on the livelihood of people of Niger Delta region of Nigeria.

Table 6 above reveals a negative and insignificant effect of environmental degradation on the livelihood of people of Niger Delta region of Nigeria. (p-value = 0.528 greater than 0.05). This implies that a 1% increase in environmental degradation will bring about 1.2% decrease in livelihood (Hdi) of people of Niger Delta region of Nigeria. This led to the acceptance of null

hypothesis that there is no significant effect of environmental degradation on the livelihood of people of Niger Delta region of Nigeria.

4.2.2 Hypothesis Two

Ho: Oil spillage has no significant effect on the livelihood of people of Niger Delta region of Nigeria.

Table 6 above reveals a positive and significant effect of oil spillage on the livelihood of people of Niger Delta region of Nigeria. (p-value = 0.007 is less than 0.05). This implies that a 1% increase in oil spillage will bring about 0.0085% increase in livelihood (Hdi) of people of Niger Delta region of Nigeria. This led to the rejection of (H_o), implying that oil spillage has a significant effect on the livelihood of people of Niger Delta region of Nigeria.

CONCLUSION AND RECOMMENDATIONS

This study has highlighted the devastation of the Niger-Delta environment as a result of several decades of oil production and the profound changes that had adverse effects on the local livelihoods and social well-being. The Niger-Delta environment has suffered degradation as a result of oil and gas exploration leading to air pollution, water pollution and land degradation from oil spillage, gas flaring and canalization.

It was also noted that such devastating activities on the environment on this poor people who relied on the environment for livelihood has resulted into a number of multiplier effect on the people. These effects range from economic to social dimensions as well as health and psychological dimensions. Though, this study delved into the former and revealed that a number of social vices experienced in the region are direct effects from the economic implications introduced into the region by oil activities. As established so far, the region is faced with myriads of environmental problems and diverse of social economic constraints that are making life unbearable for the people of the region. Today the Niger-Delta is in turmoil, restive, poor, backward and neglected. Although, the activities that come with the oil exploration and exploitation causes alterations to the environment. Which significantly have negative effects; some of the effects that come with petroleum development can be reduced or prevented basically by taking some steps in terms of prevention. Monitoring is also essential, but is lacking in the Niger Delta region. Monitoring the location of the oil companies; the terrain, the accessibility, revenue, man power availability for the

monitoring agency, qualified personnel are not available. This restricts the ability and efficiency of monitoring by the government.

Environmentalist and people generally give blame to the oil companies but the Federal Government provides the laws, legislations and license, which the oil companies must adhere to. The Federal Government has to take steps, which they have started with NOSDRA, NDDC, UNEP, UN SPDC and NGOs. Improvement have begun in terms of achieving sustainable development in the Niger Delta, the government should continue to allocate more revenue into the Niger Delta for steps toward finding a permanent and lasting solution.

Based on the consequences of oil activities in the region, it is hereby recommend

- that an integrated approach which is a combination of several development strategies. This calls for the establishment of community based integrated approach that needs joint committed efforts from the government and the multinational companies as well as other stakeholders.
- updating and revising the legislations, reviewing the license of the oil companies and reviewing the fines will go a long way in ensuring compliance, even though the government cannot systematically or frequently monitor these sites

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