

Managing Oil Spill Incident in Kpean-Yorla flow station of the Niger Delta Area of Nigeria.

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Abstract- There has been a surge in activities related to crude oil exploration worldwide, leading to a higher risk of oil spills and associated environmental hazards. In Nigeria, this has been commonplace since the launch of the country's first petroleum industry in the Niger Delta region. Oil spills have been recurring, causing significant environmental damage, especially in the oil-producing areas. This work examines oil spillage and its effects on plants and animals around the Yorla-Kpean flow station in Nigeria's Niger Delta region. It aims to evaluate how the federal government and the oil companies manage oil spill incidents and the environmental degradation caused by these spills. The research results highlight gaps and the need for improvement in managing oil spills in Yorla-Kpean to protect the environment. Similarly, it also reveals the necessity to update Nigerian environmental laws and policies. It is recommended that the government impose strict sanctions or environmental degradation. Nigeria's oil companies should adhere to international best practices in oil exploitation, and the government should go beyond mere regulation to pollution reduction by adopting different suitable technologies for oil control. Additionally, involving local communities in the Niger Delta in spill management is essential.

Index Terms- Oil spill, management, incident, Niger Delta, area, environment.

I. INTRODUCTION

In recent years, significant attention has been given to environmental degradation caused by human activities, which harm plant and animal life on land, in water and in the air, as well as people's livelihoods (OECD, 1976). Crude oil exploration is an activity that attracts substantial interest worldwide, especially in oil-producing countries like Nigeria, particularly in the Niger Delta region. This activity can negatively impact the environment, especially when accidents occur during operations, leading to oil spills. Due to the environmental impact of crude oil exploitation,

measures have been implemented worldwide to prevent the high risks of oil spills and related hazards (Ojajorotu and Gilbert, 2010). However, managing these risks is challenging because those in the oil industry are competing for "liquid gold", putting pressure on both the oil production community and the environment. According to Egwu (2012), one of the factors contributing to oil discharge into the environment is the unethical engineering practices employed by the involved industries.

An example of the catastrophic impact of oil spill is the Exxon Valdez oil spill which occurred in Prince William Sound, Alaska, on March 24, 1989 with an estimated crude oil spill of 260,000 to 750,000 barrels. More recently, the BP deep-water horizon oil spill on 20 April 2010 in the Gulf of Mexico caused by the explosion and sinking of the Deepwater Horizon oil rig. It caused an oil discharge for 87 days with an estimated total discharge at 4.9 million barrels, (Egwu, 2012). Based on these effects, the prevention, response and management of oil spills is being given top priority worldwide especially in oil producing countries such as Nigeria in order to circumvent the economic and environmental hazards of an oil spill. To this end, several initiatives have come to play. One of these initiatives is the development and enforcement of laws and emergency plans to prevent and control oil spills. However, it is curious that in most oil-producing developing countries, including Nigeria, oil spill management aims to prevent and respond to unwanted oil leaks, even after many years. Oil exploration and production activities; have not reduced the number of oil spills. This makes the Government determined to completely compensate victims of the oil spill with insufficient money, instead of focusing on the most appropriate prevention and management solution to protect the environment, society and the

environment. Oil spills from exploration activities in many parts of the world have led to severe environmental degradation in recent decades. These problems include water pollution, danger to aquatic life, destruction of flora and agricultural land including resorts, destruction of property, loss of human life and many other problems (Badejo and Nwilo, 2008).

Furthermore, the environmental impact of the oil spill could lead to unwanted migration of people from the area. According to Nwilo and Badejo (2005), the consequences of oil spills are huge because they have a negative impact on the economy of a region, pollute water sources and thus affect the health of the community. Locality, polluting the land, making it useless for agriculture and the reputation of the oil companies involved. These environmental consequences are among those of oil spills observed in Kpean-Yorla flow station in the Niger Delta region of Nigeria. Therefore, the need to take measures to prevent and control oil spills in Nigeria cannot be overemphasized. The first step in dealing with a crisis such as an oil spill is to identify the factors that caused the oil spill and the methods for dealing with similar incidents. With these results, a better management approach can be applied to prevent and respond to oil spills. Investigation of these issues could also reveal serious flaws in the oil spill control management system in Nigeria's Niger Delta region. This has increased the demand from the government and oil industries for suitable systems to deal with the problem of oil spills in the Niger Delta region of Nigeria.

1.1 Oil spillage

An oil spill is the release of petroleum (crude or refined) into the environment that usually occurs after an accident due to equipment malfunction or human error. According to the United States Environmental Protection Agency (2004), an oil spill can be defined as a discrete event in which oil is spilled accidentally or intentionally over a relative short period of time. This does not include discharges that are authorized or permitted by international or national regulations (such as MARPOL discharges from tankers) or discharges that occur over a relatively short period of time. (such as oil discharges greater than >5 ppm in

refinery wastewater), even if these spill discharge in violation of pollution regulations. According to Ifunanya (2010), oil spills are a form of industrial pollution caused by unwanted release of crude oil during oil exploration and transportation. Considering oil spills as oil pollution, the United Nations Convention defines pollution as the direct or indirect introduction of substances or energy into the environment by humans that lead to or have the potential of causing harmful effects such as destruction of biological resources and marine life, hazards. Human health, hindrance to maritime activities and other deterioration in the quality of sea water use and reduction of amenities (Islam and Tanaka, 2004). Considering these perspectives, oil spills are quantified and classified as follows to represent the extent of oil spills.

Table 1: Oil spill category, Ifeadi and Nwankwo, (1987)

CATEGORY	QUANTITY	ENVIRONMENT
Minor	Less than 25 barrels	Inland waters
	Less than 250 barrels	Onshore, offshore or coastal regions
Medium	Between 25-250 barrels	Inland waters
	Between 250-2500 barrels	Onshore, offshore or coastal regions
Major	Over 250 barrels	Inland waters
	Over 2500 barrels	Onshore, offshore or coastal regions

1.2 History of Oil Spill Incidents in Niger Delta Region of Nigeria.

Different regions of the world have witnessed oil spills due to different circumstances on different occasions and the Niger Delta region of Nigeria is no exception. The Department of Petroleum Resources (DPR) has theorized that a total of 4,647 oil spills occurred between 1976 and 1996 in the Niger Delta region of Nigeria and that these incidents contributed to the spill of oil with a total of 2,369,470 barrels, of which only about 2,369,470 barrels of oil. (23%) has been restored.

Major oil spills in the Niger Delta region include the 1978 GOCON Escravos spill, which spilled about 300,000 barrels of oil, the 580,000 barrel oil spill in 1978 as well as the storage tank incident at SPDC's Forcados terminal (Okoroji et al, 2005), and the 1980 Texaco Funiwa-5 explosion, with an estimated spill of 400,000 barrels (Tolulope, 2004, Ukoli, 2005). Several other oil spills with much less impact include the 1982 oil spill that resulted in 18,818 barrels of oil from the Abudu oil pipeline, the Idoho oil spill in January 1998 with a loss of about 40,000 barrels, and the fire resulting in the death of more than a thousand lives in Jesse. Undoubtedly, the year 1979 to 1980 recorded the largest oil spill, with a loss of about 694,117.13 barrels and 600,511.02 barrels of oil into the environment (Nwilo and Badejo (2005). Oil spills in the Niger Delta region of Nigeria have become widespread as assessed by the World Bushfire Federation of the United Kingdom in 2006 citing that the Niger Delta has experienced oil spills in the region for decades and during that time the amount of oil spilled is estimated to be about 50 times the amount (10.7 million gallons) spilled by the Exxon Valdez in Alaska in 1989. 2,405 oil spills, in particular, were recorded by the federal government between 2000 and 2006, bringing the annual average number of oil spills to 600 per year. Another 2,405 oil spills were recorded by the National Oil Spill Detention Authority (NOSDRA) between 2006 and mid-2010, with the trend expanding from year to year: 252 in 2006, 598 in 2007, 927 in 2008 and 628 in 2009 (Ezigbo, 2010). According to Egwu (2012), only if the government fulfils its responsibilities in protecting lives and creating high-income livelihoods, as is the case in other major oil-producing countries, will the amount of oil spilled in the new Niger Delta decreased.

Table 2: Oil spill incidents in the Niger Delta Region of Nigeria.(Tim cocks, 2012).

Date	Location	Gallons (quantity)	Company Vessels/oil
01/5/2001	Ogoniland	Unknown(but significant)	Shell
25/08/2001	Ogbodo	2,926,000	Shell
11/2008	Ogoniland	1,640	Shell

2/2009	Ogoniland	311,000	Shell
01/05/2010	Niger delta	29,414,000	Exxon Mobil
21/12/2011	Bonga field	1,694,000	Shell
21/06/2012	Bonga field	Unknown (but significant)	Shell

II. IMPACTS OF OIL SPILL IN NIGER DELTA

Oil spills have negative environmental impacts on the land, forests, and water of oil-producing communities. According to Worgu (2000), oil spills caused by oil exploration and exploitation activities affect the physical, biological and aesthetic values of the environment as well as the economic life and health of local people and even remote environments. Some negative impacts of oil spills are:

2.1 Environmental Impact

According to Worgu (2000), oil spills in rural communities such as the Niger Delta can have serious consequences on the lives of residents in that community. He points out that the oil spill ultimately affects soil fertility, and thus agriculture in various ways. Chindah (2000) further argues that topsoil contamination due to oil spills has made the soil in surrounding areas unsuitable for plant growth by reducing nutrient availability or increasing soil content and amount of toxins in the soil. Besides making the land barren, oil spills also kill economic and food crops, killing them or reducing their productivity. This has led to a decline in household food security.

In cases where community residents depend on agriculture, most farmers tend to migrate to more fertile lands in other communities, thereby putting pressure on scarce fertile land. While some displaced farmers migrate to urban areas in search of alternative livelihoods. Hassan et al (2002) added that in agricultural communities, the most serious problem of these communities is poor soil quality and other serious problems related to their agricultural activities, leading to lack of inputs, insufficient capital and inadequate agricultural extension

services. So if communities face oil spills and existing agricultural problems, the situation will be even worse.

Various harmful and toxic organic compounds when introduced into the natural environment by oil spills will change the geochemical composition of soils, rivers and other environmental components, leading to deforestation and topsoil erosion. This in turn affects agriculture and leads to a severe decline in output from agricultural and fishery activities. Stanley (1990) determined, from interviews about oil spills in several communities in developing countries, that agricultural land pollution is a major problem. Farmers have responded very positively to the pollution of agricultural land due to the absence of modern agricultural techniques to meet the challenges of decreasing land resources. In addition, plummeting agricultural production means they cannot meet demand, leading to intensive exploitation of other fertile lands. The long run effect of the oil spill is land degradation and out-migration to other rural and urban areas, where pressure is exerted on the often inadequate and dilapidated infrastructure, leading to increased poverty and penury as more displaced inhabitants move to other particular areas in search of non-existent jobs.

2.2 Socio-Economic Impact

In addition to the loss of farms, oil can seriously affect the socio-economic conditions of a locality (Gbadegesin.A, 1997). He emphasized that the main socio-economic impact of the oil spill started with farmers and fishermen, but spread to the whole society. It is noted that oil pollution of land and water leads to interference and loss of recreational activities such as diving and sporting events. Businesses that use rivers and seas for normal operations can also be affected by oil spills.

Another negative impact caused by oil spills includes loss of tourism, such as pollution of beaches and protected areas. This resulted in a reduction in the number of residential and non-resident tourist/resort visitors to areas affected by the oil spill, which in turn affected businesses such as restaurants, hotels or charter boats rent. According to Owabukeruyele (2009), oil spills have disastrous impacts on the socio-natural environment because they threaten the

fragile subsistence farmer economy and biodiversity, as well as social livelihoods and the survival of the people. He further pointed out that oil-producing communities along coastal areas remain fundamentally dependent on these companies for survival. As a result, living standards have deteriorated, especially shortages of drinking water, social amenities and job losses, leading to local chaos. Indeed, many oil spills have devastated the businesses of some community members, which were their main source of income. Without a better alternative, people are forced to drink contaminated water and live in a polluted environment.

2.3 Health Impact

According to Izeogu (1986), crude oil is a toxic substance, harmful to most animal and plant species. When spilled, it will pollute the environment, affecting the health and general living conditions of the affected localities. Evidence of the health status of communities where oil spills have occurred is believed to be a direct result of the oil. Some health problems arise from negative environmental impacts such as pollution of water sources that communities rely on. River pollution causes local people to suffer from water-related diseases such as; Typhoid and malaria cause fluid retention, diarrhoea and other skin diseases. For example, in some communities, pipes pass through village streams, which serve as a water source for residents. Additionally, in the event of an oil spill, the public as well as oil company workers may be exposed through inhalation, dermal contact, or direct impact. Dermal and inhalation routes tend to result in exposure to various components of the crude oil. In other words, humans may be exposed through the skin to volatile and non-volatile ingredients, some of which are capable of being absorbed through the skin, causing skin irritation or dermatitis. The obvious source of inhalation exposure is volatile chemicals, the main groups being alkanes, aromatics, and sulfur compounds (Park and Holliday). Health effects associated with exposure to crude oil include obvious signs of acute poisoning in humans - dizziness, nausea, difficulty breathing, and headache, fatigue, as well as eye irritation. Prolonged exposure to high doses of these compounds has also been found to lead to irreversible bone marrow damage, causing a

plastic anaemia and leukaemia (Park and Holliday, 1999).

III. METHODS AND PROCEDURES

3.1 Qualitative and Quantitative Research

All qualitative research uses words and perceptions to express reality and attempts to describe individuals in characteristic circumstances, while quantitative exploration uses numbers to express concepts or ideas (Amaratunga, 2002). Qualitative evaluation seeks to understand distinct perceptions of issues or topics and in-depth knowledge about them, rather than quantitative research, which reflects the measurable statistical parts of the study (Strauss & Corbin, 1990).

In this study, both qualitative and quantitative data were collected. This model was used because the study included understanding participants' perspectives on oil spill issues, taking into account the causes and effects as well as how to manage oil spills in the region. The qualitative data collected was broken down and the investigation of quantitative information included illuminating details, including the relationships between variables. Merging the two strategies provides a better understanding of topics such as the causes, impacts and management of oil spills in Kpean-Yorla flow station in the Niger Delta region of Nigeria.

IV. RESULTS ANALYSIS

To identify the causes and impacts of oil spills at the Kpean-Yorla flow station in the Niger Delta region of Nigeria, it is necessary to assess feedback from questionnaires distributed to the region's inhabitants, oil company workers, and the government authority responsible for oil spills in Nigeria. This seeks to identify the causes of oil spill incidents in the Niger Delta region, determine the impact to the environment and also the effectiveness of the management approaches for oil spill occurrences in the Niger delta region. The discussions are based on the analysis of collective feedback from distributed questionnaires, supported by interviews conducted on the subject matter.

4.1 Participants description

A total of 400 questionnaires were distributed to the people of Kpean, in Khana local government area of Rivers state, in the Niger Delta region of Nigeria. Of the 400 questionnaires distributed, 376 were returned. Of the amounts returned, 6 were incomplete and 20 were empty, suggesting the person may have decided not to participate when 350 were fully completed. The characteristics of the 350 participants are summarized in Table 3:

Table 3; gives a description of the attributes of the participants. The profile of the 350 individuals demonstrates that all respondents have stayed in the Niger Delta region for at least two years. 72% (n=252) of the total respondents were male 28% (n=28) and were female 32% (n = 112) were adult individuals aged 18–25 years; 60% (n=210) were between 26 and 35 years old; 8% (n = 28) were between 36 and 45 years old; No cases were recorded before age 46 or older. As shown in Table 3, 66% (n = 231) of the respondents were fishermen and farmers. This was followed by trade and business at 14% (n = 49), while employees accounted for 10% (n = 35) and other types of employment for 10% (n = 35), respectively. These identified job types are consistent with the literature as common among the majority of people in the Niger Delta region. The table also shows the respondents' current qualifications and professional qualifications.

Table 1: Respondents {participants} profile

Categories	Number of respondents (N)	%
Gender		
Female	98	8
Male	252	2
Age		
18-25	112	3
26-35	210	2
36-45	28	6
46+	0	0
Duration of stay in region		

2-3years	28	8
3-4years	42	2
4+ Years	280	0
Job Type		
Fishing/farming	231	6
Trading/Business	49	6
Wage earner	35	1
Other	35	4
Work status		
Permanent	49	1
Temporarily	126	4
Unemployed	175	3
Education qualification		
Primary	91	6
Secondary	77	2
Tertiary	42	2
Others	140	1

4.2 Knowledge of oil spill

According to the responses collected in the survey, all Respondents knew about the oil spill. 70% of respondents reported good knowledge of oil spills, 20% had average knowledge, and 10% had only basic knowledge, as shown in Figure 1 below. This is necessary to demonstrate that respondents have clearly understood the topic and the survey questions that need to be answered.

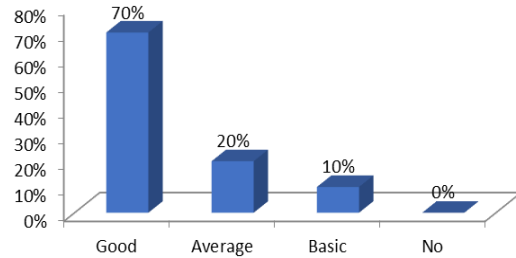


Figure 1: Knowledge of oil spill.

Additionally, the survey went further to find out how many respondents were victims or witnesses of an oil spill. The results of this particular question were shocking because all respondents (100%) said they had experienced an oil spill. Interviews confirm that this is normal for people in the area. This is because most pipelines intended to transport extracted crude oil are located along residential areas or next to roads that are easily visible to the public. Therefore, it is easy to observe oil spills occurring when an incident such as a pipeline leak occurs.

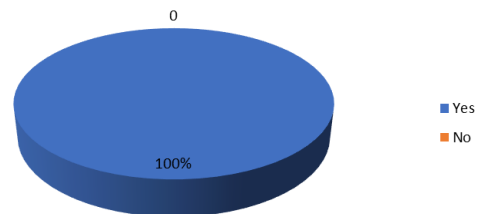


Figure 2. Experience of oil spill incident

4.3 Number of Oil spill

In the chart below, 4% of respondents said they had experienced between 1 and 10 incidents since their stay in the Niger Delta region, 6% said they had experienced about 11 to 20 spills oil during his stay in Niger Delta region, while up to 90% reported

experiencing more than 21 oil spills since their stay in the Niger Delta. These questionnaire survey results can be verified from data obtained from the Nigerian Ministry of Petroleum Resources as can be seen below in (Figure 4) showing the extent of oil spills in the Niger Delta region for the specific period from 1997 to 2013. The data shows that oil spills in the region exceeded 100 incidents in a given year from 1997 to 2013. This result is consistent with the results of study when respondents noted that based on the survey, the number of oil spills was very large. Similar findings were obtained in the interview section as interviewees concluded that the rate of oil spills in the area could be classified as high.

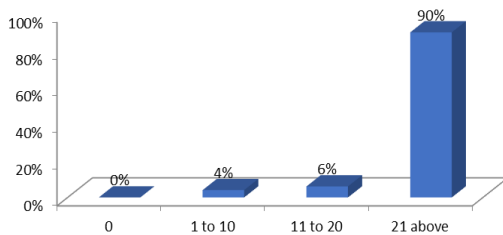


Figure 3. Number of oil spill occurrence

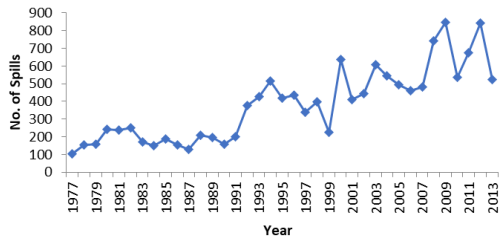


Figure 4: Oil spill incidents

This large oil spill event that occurred many years ago is very worrying. Generally, it means that the majority of local people have sufficient knowledge about oil spills in the Niger Delta region of Nigeria. From the field survey, the interviewed participants admitted that the majority of people in the Niger Delta region of Nigeria knew about the oil spill because many of them had experienced it.

4.4 Causes of oil spills

As noted in Figure 5, there are 8 main causes of oil spills. The data presented in this work aims to determine the causes of oil spills in the Niger Delta region, specifically the number and frequency of oil

spills in the region as collected in the previous section.

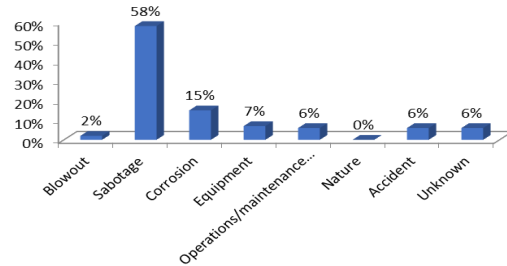


Figure 5: Causes of oil spill

Figure 5 above shows that the main cause of oil spills in the Niger Delta region is pipeline sabotage. 58% of respondents believe that the main cause of oil spills is sabotage on a scale of 1 to 8, in which 1 is the lowest cause of oil spills and 8 is the most common cause of highest oil spill in the region. This result is also consistent with the literature as Egbe and Thompson (2010) grouped sabotage as one of the causes of oil spills in the oil producing area of Nigeria. The respondents' results also coincided with data obtained from the Department of Petroleum Resources (2014) showing the causes of oil spills from 2011 to 2013. Vandalism was identified as the main cause of oil spills in the area.

4.5 Factors responsible for the cause of oil spill

As described in Figure 6, oil spills have many causes. Therefore, the investigation seeks to determine where possible is the reason for the inspection. Questions have been grouped into seven themes to identify the causes or factors that caused the oil spill in the Niger Delta region

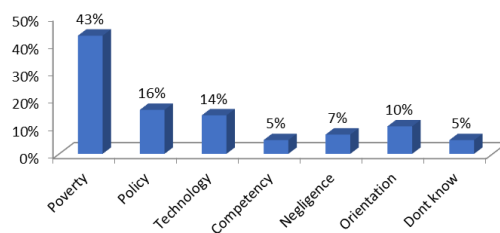


Figure 6: Factors responsible for oil spill

Figure 6 shows that poverty is the main cause of the oil spill. 45% of residents in the area surveyed attributed the oil spill to poverty, while 16% and 14%

of respondents listed politics and technology as contributing factors of oil spill. 4% of respondents cited human capacity to conduct oil and gas activities in the region, while 5% cited negligence on the part of the parties responsible for the oil and gas industry in the region and 10 % believe that the reason is due to people's orientation. This is due to the destruction of agricultural land and water resources by oil on which most people depend for their livelihoods, such as farming, fishing and other businesses. This is also consistent with the literature, as Worgu (200) points out, that oil spills ultimately affect soil fertility. When agricultural land and water pollution occur in that area, people have little or no source of income, which in turn leads to other means of survival, such as sabotaging pipelines for extortion and selling oil to make money or to compensate oil-related parties and water gas exploitation in the area.

4.6 Amount of Inhabitants affected by oil spill

From the survey as detailed below in Figure 7, all respondents indicated that they have been affected by oil spill. This means that the majority of the region's inhabitants feel the consequences of the oil spill in the region. As seen from Figure 7, the survey went further ahead to find out if the region has been affected in one way or the other by oil spillage. 100% of the respondents indicated that there have been in one way or the other affected by oil spillage incident.

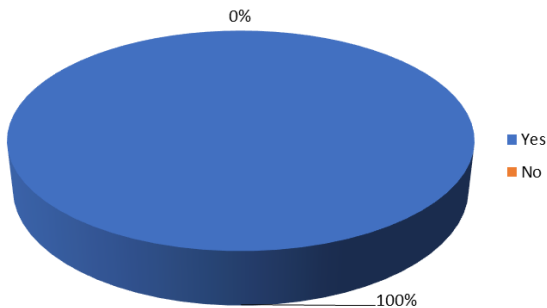


Figure 7: The number of inhabitants affected by oil spill

4.7 Main areas affected by oil spill

As shown in the top subsection of Figure 7, all respondents reported experiencing the effects of an oil spill. Investigations then proceeded to determine what primarily affected the area and the lives of its

residents. The results are detailed in the following figure (see Figure 8).

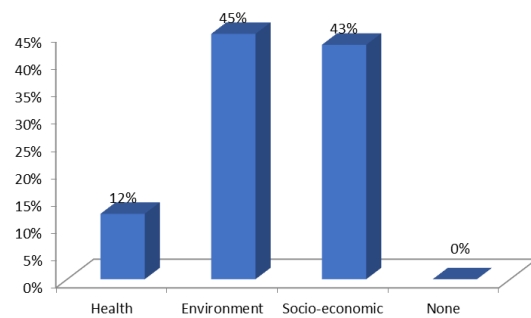


Figure 8: Main areas affected by oil spill

Figure 8 shows that the majority of respondents say the environment is their main concern. This is evident, as the majority of residents in the Niger Delta region are farmers and fishermen. This is further evidenced in the literature review, in which Badejo and Nwiro state that agriculture and fishing account for 48% of employment in the Niger Delta, which impacts the local economy. Businesses such as restaurants and hotels are facing reduced profits due to a drop in tourists on oil spill. This is due to the pollution of coasts and reserves from oil spills. This is consistent with the ITOPE (2009) literature review, which found that land and water contamination from oil spills leads to disruption and loss of recreational activities such as diving and sporting events. Companies that use rivers and oceans for normal business activities may also be affected by oil spills. The health of residents was also said to have been affected by the oil spill, but the survey found that this was not the biggest concern.

4.8 Degree of oil spill impact

Figure 9 presented the degree of oil spill in the Niger Delta. The (Figure 9) revealed that most oil spills in this region are large-scale oil spills. 95% of respondents rated the impact of the oil spill in this region as "major," and only 5% rated it "minor," but no one answered that they perceived the impact to be small. There wasn't. These percentages may be related to the amount of oil barrels released into the environment during the accident.

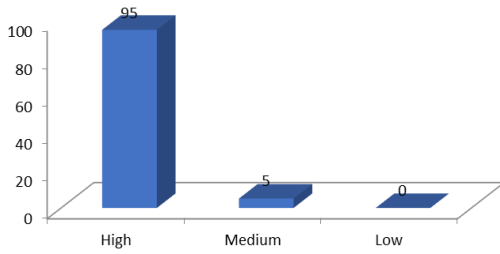


Figure 9: Degree of oil spill impact

These results are consistent with the interview part, with the majority of respondents pointing out that not only the amount of oil drums leaked into the environment is alarming, but also the frequency with which it occurs. This section corresponds to data from the Nigerian Ministry of Petroleum Resources (Figure 10). This data shows the frequency of oil spills and the number of barrels of oil spilled in a given year in areas classified as high based on oil spill incidents.

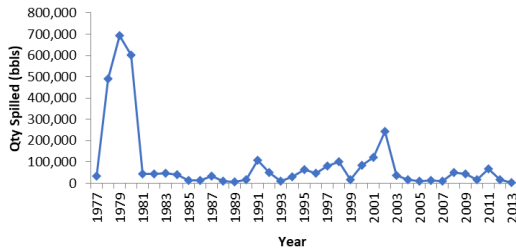


Figure 10: Quantity of oil spilled

4.9 Duration of oil spill impact

The impact of an oil spill can be devastating on the environment, the economy, and the health of people in a particular area. The study seeks to know the impact duration of the oil spill in the Niger Delta region to improve management. From analysis, the majority of respondents said that the consequences of an oil spill in the region in most cases could take more than six months to be controlled, while only 1% said it would take from three (3) to six(6) months to prevent or control the effects of an oil spill and no period specified is less than 3 months. From Figure 11, it can generally be seen that majority of the respondents have been affected by the impacts of oil spill and these impacts can be rated high due to the quantity of barrels spilled and rate of oil spill

incidents and even more the duration it takes to control majority of incident/impact. The oil spill incident has affected the environment, socio-economy and health of person residing in the region.

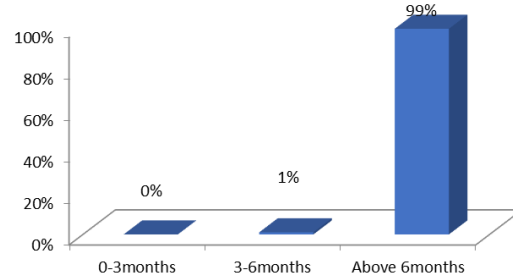


Figure 11. Duration of oil spill impact

4.10 Oil spill control performance

Overall, to know how oil spill management is carried out, feedback from authorities was collected on the implementation of oil spill management in the area. Based on the analyzed results of respondents, 90% rated the effectiveness of oil spill handling in the Niger Delta region as poor, while 10% rated it as average or poor, with no rating as high (Figure 12). This results is in consistent with respondents' statements that oil spill management in the Niger Delta region is poor. However, they attributed this poor performance to the terrain and the violence they encountered from residents and, in some cases, the illegal taxes they had to pay before the clean-up operation or prevent oil spill disasters.

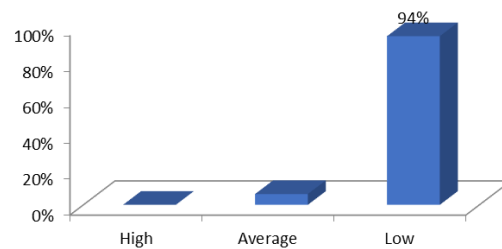


Figure 12. Oil spill control performance

V. CONCLUSION

The oil spill has had a major negative impact on Nigerians and the entire economy. An illustration of this can be seen in the friction caused between oil production and maintenance companies and the public, leading to frustration, accusations, conflict,

discontent and general distrust. The management and control of oil spills is still weak, directly contributing to increasing negative impacts on those involved. At the heart of this dire situation are the largely outdated laws and regulations of the Nigerian oil industry, which have been replaced by current technology in the extraction and use of crude oil. Therefore, there is an urgent need to review existing laws on the oil and gas industry and develop new laws. The newly enacted laws must be relevant to the current situation and strictly enforced to combat every aspect of the industry and more importantly, combat oil spills.

The cause of oil spill could lead to an extremely disastrous situation and should be considered a national emergency by the Nigerian government whenever it occurs. Not only because this is the case in other oil-producing regions of the world, but also because this is the responsible approach. The government must ensure effective capacity building at all levels by providing basic oil spill facilities and equipment, besides recruiting qualified personnel for oil spill management and control. Currently, the Nigerian oil industry largely depends on foreign experts, international oil companies and other foreign organizations to manage oil spills. This approach fails to add value to local content related to the development and transfer of relevant technologies and only reduces the country's capacity to respond quickly and effectively to disruption oil spill incident. Well-developed oil spill management must include extensive local oil spill knowledge and a clear national oil spill contingency plan, provision of trained personnel, and major investment in facilities, response/clean-up equipment and technology. .

Effective partnerships between the public and private sectors are needed to combat oil spills in Nigeria, with government playing a key role. Private companies cannot be left behind and have so far failed to demonstrate commendable social responsibility, both in their operations and in their relationships with host communities regarding the impact of their environmental activities. Decades of exploitation in the oil-producing areas of Nigeria's Niger Delta have not brought much-needed development to the mining community and there is some discontent among stakeholders. When an oil spill occurs, the offending companies are responsible

for ensuring the spill is remedied as quickly as possible. Companies must take responsibility for their actions and host communities cannot continue to be taken for granted.

The Nigerian Government has referred to several cases of oil spills that were handled appropriately and in the best interests of the people. Classic examples are the Exxon Valdez oil spill disaster and the BP Deep Water Horizon oil spill, both of which provide guidance on how to handle large-scale oil spills. At the height of the EVOS crisis, the US government deployed 11,000 personnel, 85 aircraft, and 1,400 ships for cleanup operations. In the three weeks following the BP Deep Water Horizon oil spill, the company provided 520 vessels and other equipment and personnel to contain the spill. Exxon Mobil, in the three years since the crisis, has spent more than \$2 billion and in the BP Deep Horizon case, \$32 billion was earmarked for cleanup and compensation. Nigeria should copy the US compensation process for the EVOS and Deep-water Horizon experiments.

REFERENCES

- [1] Adelana, S.O, Adeosun, T.A, Adesina, A.O and Ojuroye,M.O. (2011): Environmental Pollution and remediation: Challenges and management of oil spillage in the Niger coastal areas. *America journal of Scientific and Industrial Research*, 2 (6), pp. 834-845.
- [2] Amaratunga, D. Baldry, D.Sarshar,M. and Newton.R. (2002). Quantitative and Qualitative Research in the Built Environment: Application of Mixed Research Approach. *Journal of Work Study*, 51(1), pp. 17-31.
- [3] International, A., 2008. Nigeria petroleum pollution and poverty in the Niger Delta, united kingdom: Amnesty International publication.
- [4] Badejo, O. T and Nwilo. P .C (2008): Impacts and management of Oil Spill Pollution along the Nigeria Coastal Areas.
- [5] Badejo, O. T and Nwilo, P. C (2009): Management of oil spill dispersal along the Niger delta region. Available at

- <http://www.isprs.org/proceedings/xxxv/congress/comm7/papers/241.pdf>.
- [6] Blaikie, N., (2000) *Designing Social Research: The Logic of Anticipation*. London: John Wiley and Sons Inc.
- [7] Collis, J. and Hussey, R., (2009) *Business research: a practical guide for undergraduate and postgraduate students*. 3rd ed. Basingstoke: Palgrave Macmillan. 358p. ISBN 781403992475
- [8] Cone, 1991. Fatal injuries at work in California. *Journal of occupational medicine*, 33(7), pp. 813-817.
- [9] Davies.M.B, 2007. *Doing Successful Research Project*. In: *Using qualitative or quantitative methods*. London: palgrave macmillian.
- [10] Department of Petroleum Resources (2014). Oil spill data.
- [11] Dennis R 2009: *What is migration?* Publisher: Tear fund international
- [12] Egwu S A (2012): *Oil spill Control and Management*. *Petroleum Technology Development Journal* (1), pp. 1595-9104.
- [13] Eldabi, T, Paul, R. J, Taylor, S. J (2002). *Integrated approached to health informatics research and development*. *Logistics Information Management*, 15(2) 138-152.
- [14] Gbadegesin. A, (1997). *Impact of oil exploration and production activities on the environment: implications for peasant agriculture*. A seminar paper on oil and the environment organized by Friendrick Eibert Foundation Port harcourt, pp. 9-14.
- [15] Hassan, C., Olawoye, J. and Nnadozie, K. 2002. *Impact of International Trade and Multinational Cooperation on the Environmental and Sustainable Livelihood of Rural Women in Akwa Ibom State, Niger Delta Region Nigeria*.
- [16] Hines, P., Taylor, D., (2000), *Going Lean*, Lean Enterprise Research Centre, Cardiff, pp.3-43.
- [17] Ifeadi, C. N. and Nwankwo, J.N. (1987). "Critical Analysis of Oil Spill Incidents in the Nigeria Petroleum Industry". *Proceedings of the 1987 International Seminar on Petroleum Industry and the Nigerian Environment Oweri, Nigeria*: pp104-114.
- [18] Kumar. R (2005): *Research Methodology; A step by step guide for beginner's* Sage publication, London Chp.12pp174-175.
- [19] Mackey, A. and Gass, S.M. (2005), "Second Language Research: Methodology and Design" Routledge
- [20] Mokrousov, S. (2014) *Safety measures for transmission pipeline transport of natural gas and hazardous liquids in the Russian federation*. Available at www.unece.org/fileadmin/DAM/env/teia/water/pipeline/end-ve-mokrousov-ppt.pdf
- [21] Ntukekpo (1996): *Spillage: bane of petroleum, ultimate water technology environment*
- [22] Nwilo.P. and Badejo.O. (2005): *Oil spill problems and management in the Niger delta*. International Oil spill conference, Miami, Florida, USA
- [23] OECD (1976): *Managing the Environment: The Role of Economic Instruments*. Paris: OECD, p 191.
- [24] Ojatorotu V and Gilbert L (2010): *Checkmating the resurgence of Oil Violence in the Niger delta of Nigeria*.
- [25] Olagoke w (1996): *Niger delta environmental survey: which way forward*.
- [26] Orlikowski, W. J. and Baroudi, J. J. (1991) *Studying Information Technology in*
- [27] *Organizations: Research Approaches and Assumptions*. *Information Systems Research*. (2) 1-28.
- [28] Owabukeruyele, W.S. 2009. *Hydrocarbon Exploitation, Environmental Degradation and Poverty in the Niger Delta Region of Nigeria*. Lund University. Sweden. [January 30, 2000]. [Online] Available: [mhtml: file//E:\ oil spill information for literature review.mht](http://mhtml:file//E:\oil%20spill%20information%20for%20literature%20review.mht).

- [29] Ozekhome (2011): Legislation for growth in the Niger delta region. *Midweek Pioneer*
- [30] Park, J.M and Holliday, M.G. 1999. Occupational Health Aspect of Marine oil-spill Response. Ottawa, Ontario. Canada. 71(1) 113-133.
- [31] Smith NC (2003): Corporate Social Responsibility: Whether or How? *California Management Review* 45(4): 52-76.
- [32] Stanley, W.R. 1990. "Socio-economic impact of oil in Nigeria". *Geography Journal*, 1990. 22 (1) 67-79.ss
- [33] Stepping Stone Nigeria. 2009. "The impact of the oil industry". Lancaster. [Online] Available:
<http://www.steppingstonesnigeria.org>