Disaster Response and Recovery Practices among Oil Spill Impacted Communities in Selected States in Niger Delta Region, Nigeria

Abstract

The study examined the disaster response and recovery practices among oil spill impacted communities in selected states in Niger Delta region of Nigeria. The study cut-across six (6) LGAs from three (3) states, that is, Akwa Ibom, Bayelsa and Delta while questionnaire was administered among 400 respondents with return rate of 94% amounting to 375 valid questionnaires. The returned questionnaires were analysed using descriptive statistics and ANOVA for the study hypotheses. The outcome of the study indicated that abandonment of spilled site (21.3%) is the most adopted response practice while in-situ burning of oil (22.4%) and scooping of the spilled oil (22.1%) as the major recovery practices. Statistically, there was no significant difference in post-disaster practices such as disaster response (where $p > 0.05$, $p= 0.116$) and recovery (where $p > 0.05$, $p= 0.775$) across the states. In conclusion, there is need for synergy among all the multi-agency and involvement of the community in deriving long lasting post-disaster practices. Harmonizing several overlapping legislations and governance institutions was recommended.

Keywords: Disaster Management Practice, Disaster Response, Disaster Recovery, Oil Spill, Niger Delta

Introduction

"Oil is a general term used to denote liquid petroleum products which mainly consists of hydrocarbons. The release of oil into the natural environment is termed oil spill. The extraction, refining, transportation and storage of oil are accompanied by seepages and spills by operations or accidents" (Egbe and Thompson, 2010). "Deliberate act such as sabotage, oil bunkering, lack of maintenance of engineering equipment, tanker accidents could cause oil spill. Oil spill can also occur naturally through natural disasters like hurricane and earthquake, movement of tectonic plate and inadequate trap system" (Egbe and Thompson, 2010). According to Egbe and Thompson (2010) "oil spill sites are a common phenomenon in the Niger Delta region and multinational oil companies (MNOCs) records and investigations of spills in the region are also heavily disputed and politically sensitive".

Approximately 90% of Nigeria's exports and 75% of the consolidated budgetary revenue comes from oil and gas, the majority of which comes from the Niger Delta region (Ebegbulem et al., 2013) which consisting of nine states; Abia, Akwa Ibom, Cross Rivers, Bayelsa, Delta, Edo, Imo, Ondo and Rivers – the Niger Delta is the third largest wetland in the world and has over 40 ethnicities and over 30 million people (Idowu, 2012; Maitland and Chapman, 2014). "Shell, Exxon, Total, and Eni (Agip), among others, operate both onshore and offshore oil facilities in the Niger Delta, with an estimated 37.2 billion barrels of proven crude oil reserves as of January 2013" (Energy Information Administration, 2013; Maitland and Chapman, 2014).

The ability to deal with oil spill incidents over time requires immediate disaster response and well-coordinated post-disaster activities such as recovery, rehabilitation and restoration. The post-disaster activities of disaster management ensure prompt response to any threatening disaster situation or disaster; coordinated and adequate recovery process and effective rehabilitation and restoration activities that will ensure impacted communities or societies are returned back to their previous state before the disaster (Afolabi et al., 2023). "Disaster management involves all levels of government, non-governmental and community-based organizations play a vital role in the process. In recent times, oil pipelines have faced three interwoven problems: vandalism, sabotage and terrorism. These problems have huge environmental, economic, health and safety as well as security implications on the Government, pipeline operators and host communities alike. While Nigeria had about 2,787 pipeline breaks between 2010 and 2012, the figure is analysed to be at about 15,685 between 2002 and 2012" (Chukwuma, 2013). "These pipeline incidences translate to huge economic loss and massive environmental pollution. On many occasions they have resulted in loss of lives for workers and host communities with over 2,500 lives lost in a period of 15 years" (Chukwuma, 2013).

Several studies have been carried out on the issue of oil spill disaster in the Niger Delta region (Okoye and Okunrobo 2014; Ebegbulem, *et al.*, 2013, Bello and Olukolajo, 2016; Onyegeme-Okerenta *et al.*, 2017; Adekola, *et al.*, 2017, Emelu et al., 2021a, 2021b; Emelu et al., 2023); however, there is an existing gap in knowledge on the post-disaster activities of oil spill disaster that could reduce the possible impacts in the region. The aim of the study was to assess the disaster response and recovery practices among oil spill impacted communities in selected states in Niger Delta Region, Nigeria. The objective guiding the study includes; examine the oil spill disaster response among the selected communities and assess the oil spill recovery practices and the role of the community in the activities.

Material and Methods

Study Area

The Niger Delta Region of Nigeria is located on 4º49'60"N and 6º0'00"East (Figure 1) protruding towards the Gulf of Guinea on the Atlantic coast of West Africa (Shittu, 2014). "The Niger Delta region is a densely populated area in Nigeria. Its population is about 31 million people. The land mass extends over about 70,000 km^2, and make up 7.5 percent of Nigeria's landmass. The region consists of the present day Abia, Akwa- Ibom, Bayelsa, Cross- River, Delta, Edo, Imo, Ondo, and Rivers states. The Niger Delta region is oil-rich by nature and has been the centre of international controversy over waste of natural resources, pipeline vandalism, devastating pollution, ecocide, and human rights violations. The nation extracts over 2 million barrels of crude oil from the Niger delta region in a day" (Ekwo, 2011).

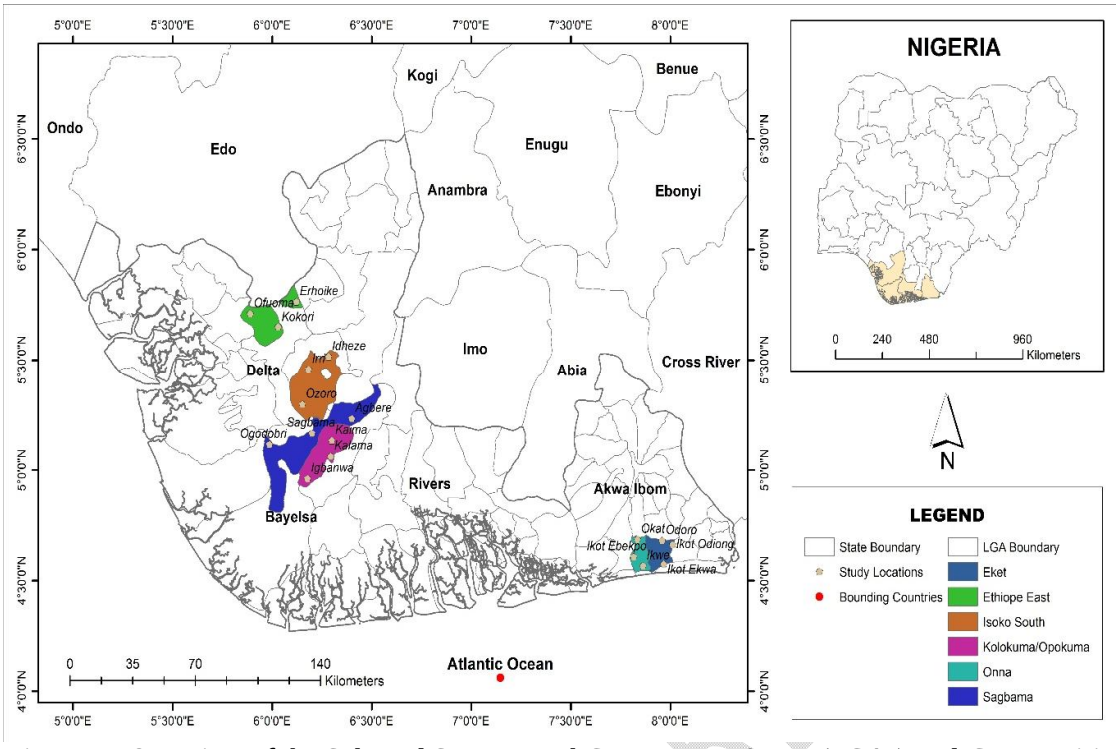

Figure 1: Overview of the Selected State, Local Government Areas (LGAs) and Communities

Study Design and Sample Size

The survey research method was adopted to carry out the study. This method was adopted because it is a suitable and efficient way of studying large population.

To get an optimum sample of the target population (1,773,696) the Taro Yamane (1967) formula for sample size determination will be adopted;

$$n = \frac{N}{1 + N\,(e)^2} \quad \text{..... (3.2)}$$

Where: e= Level of precision (0.05), N= Population, n= Sample size, 1= Constant

$$n = \frac{1773696}{1 + 1773696\,(0.05)^2}$$

$$n = \frac{1773696}{1 + 1773696 \times 0.0025}$$

$$n = \frac{1773696}{1 + 4{,}434.24}$$

$$n = \frac{1773696}{4{,}435.24}$$

$$n = 399.9 \sim$$

$$n = 400$$

The distribution of the sample size will be based on the percentage of each of the LGAs of study in the projected population which also determines the amount of questionnaire that will be distributed among the LGAs (Table 1).

Table 1: Percentage Distribution of Questionnaire

States	LGAs	Projected Population (2020)	Percentage in Projected Population	Distribution of the Questionnaire
Akwa Ibom	Onna	176,115	10	40
	Eket	590,472	33	132
Bayelsa	Kolokuma/Opokuma	128,411	7	28
	Sagbama	302,728	17	68
Delta	Ethiope East	195,032	11	44
	Isoko South	380,938	22	88
Total		**1,773,696**	**100**	**400**

A total of 400 copies of questionnaire was randomly administered using simple random sampling technique in respondents' selection; however, 375 of the questionnaires were properly filled and subjected to further analysis.

Data Analysis

The retrieved copies of questionnaire were coded and subjected to statistical analysis using Statistical Package for the Social Sciences (SPSS-21) for proper analysis. The data of the study were analysed through descriptive (frequency count, percentage) and inferential statistics (Analysis of variance-ANOVA). Baridam (2001) the use of descriptive statistics as statistical techniques helps to summarize our data and be able to describe such data

Results

Oil Spill Disaster Response Activities

The oil spill disaster response practices available in the study area was assessed and presented in Table 2. Among the respondents, 57 (15.2%) perceived the disaster response practice available to be repair of facility with immediate clean-up activities, 63 (16.8%) perceived

repair of facility with prolong clean-up activities as common disaster response practice, 80 (21.3%) noted abandonment of site as common practice, 67 (17.9%) noted arrest of the perpetrators, 75 (20.0%) noted that immediate present of Emergency Response Team (ERT) as common practice while 21 (5.6%) and 12 (3.2%) of the respondents perceived immediate present of security agencies and other related activities as the common disaster response practices respectively. At individual states, the respondents in Akwa Ibom noted that repair of facility with prolong clean-up activities as common disaster response practice (35-23.6%) while those of Bayelsa and Delta perceived abandonment of site (27-30.3%) and repair of facility with immediate clean-up activities (29-23.2%) as the common disaster response practices respectively.

The analysis on the hypothesis stating that there is no statistically significant difference in the disaster response activities among the communities in the study area showed that the Sig.-value was used to determine the levels of significant (where P–Value < α (0.05) reject null hypotheses; P–Value > α (0.05) accept the null hypothesis) were adopted (Table 3).

Table 2: Oil Spill Disaster Response Activities in the Study States

Variables	Akwa Ibom		Bayelsa		Delta		Total (%)
	N	%	N	%	N	%	
RF with immediate clean-up activities	16	9.9	12	13.5	29	23.2	57 (15.2)
RF with prolong clean-up activities	38	23.6	6	6.7	19	15.2	63 (16.8)
Abandon the site	25	15.5	27	30.3	28	22.4	80 (21.3)
Arrest the perpetrators	31	19.3	18	20.2	18	14.4	67 (17.9)
Immediate present of ERT	26	16.2	22	24.7	27	21.6	75 (20.0)
Immediate present of security agencies	19	11.8	1	1.1	1	.8	21 (5.6)
Others	6	3.7	3	3.4	3	2.4	12 (3.2)
							375 (100)

Table 3: One-way ANOVA analysis for Disaster Response Activities

	Sum of Squares	Df	Mean Square	F	Sig.	Decision
Between Groups	15.438	2	7.719	2.165	0.116	
Within Groups	1326.071	372	3.565			**H_o Accepted**
Total	1341.509	374				

Oil Spill recovery practices and the role of the community

Considering the disaster recovery practices towards oil spill events (Table 4), 83 (22.1%) of the respondents indicated scooping of spilled oil as common recovery practice, 84 (22.4) indicated in-situ burning of spilled oil, 72 (19.2%) indicated abandonment of the spilled site as common practice, 53 (14.1%) of the respondents indicated dispersant application and bioremediation action (53-14.1%) respectively. Also, 20 (5.3%) of the respondents noted that none of mentioned practices are available in the communities while 9 (2.4%) of the respondents noted that all the mentioned practices are available in the communities. Considering the role of community people during recovery activities, 133 (35.5%) of the respondent indicated that community provides manpower for the recovery activities, 85 (22.7%) noted that community provide the necessary information required for the recovery activities while 114 (30.4%) and 43 (115) of the respondents indicated that community provided conductive environment for the clean-up and other activities such as selling of essentials respectively.

Similarly, the analysis of variance (ANOVA) on the hypothesis stating that there is no statistically significant difference in the disaster recovery practices among the communities in the study area reveals that the Sig.-value was used to determine the levels of significant (where P–Value < α (0.05) reject null hypotheses; P–Value > α (0.05) accept the null hypothesis) were adopted (Table 5).

Table 4: Oil Spill recovery practices and the role of the community

Oil Spill Disaster Recovery Practice							
Scooping of Spilled oil	35	21.7	18	20.2	30	24.0	83 (22.1)
In-situ burning of oil	40	24.9	20	22.5	24	19.2	84 (22.4)
Abandon the site	35	21.8	18	20.2	19	15.2	72 (19.2)
Dispersant application	20	12.4	13	14.6	20	16.0	53 (14.1)
Bioremediation	21	13.0	11	12.4	21	16.8	53 (14.1)
None of the above	5	3.1	6	6.7	9	7.2	20 (5.3)
All of the above	5	3.1	3	3.4	1	.8	9 (2.4)
							375 (100)
Community Role During Recovery							
Provided man power for the activities	51	31.7	37	41.6	45	36.0	133 (35.5)
Provided necessary information	48	29.8	20	22.5	17	13.6	85 (22.7)
Conducive environment for clean-up	48	29.8	27	30.3	39	31.2	114 (30.4)
Others	14	8.7	5	5.6	24	19.2	43 (11.5)
							375 (100)

Table 5: ANOVA Table for Disaster Recovery Activities

	Sum of Squares	Df	Mean Square	F	Sig.	Decision
Between Groups	1.852	2	.926	.255	0.775	
Within Groups	1351.705	372	3.634			**H_o Accepted**
Total	1353.557	374				

Discussion

Considering the post disaster activities such as response and recovery practices for oil spilled event in the study area, the outcome asserted that the most adopted response practice was abandoned of sites while other practices include immediate present of emergency response team, arrest of the perpetrators, repair of facility with prolong clean-up activities, repair of facility with immediate clean-up activities and immediate present of security agencies.

According to United Nation Environment Programme (UNEP Report, 2011), clean-up and remediation, which are supposed to occur immediately, are often delayed and, when they do occur, employ less effective remediation techniques that do not reflect international best practices. Indeed, Environmental Rights Action estimates that over 90% of spills in the Niger Delta have not been cleaned up (Okeowo, 2014). Corroborating the study finding, Ingelson and Nwapi (2014) opined that oil companies face difficulties accessing spill sites, and complicated community dynamics that contribute to spills and confuse and undermine remediation efforts. According to Maitland and Chapman (2014), "response to oil spills has been marked by corruption, lack of effective communication, power struggles, and an almost total failure to adequately remedy oil spills by cleaning and restoring the environment and compensating those harmed".

On the recovery practice, the outcome of the study indicated in-situ burning of oil and scooping of the spilled oil as the major recovery practices. Other available practices include abandonment of spilled site, dispersant application and bioremediation among others. According to the study conducted by IUCN Niger–Delta Panel (2013) the current remediation practices in oil-impacted areas in the Niger Delta do not visibly support the needs of biodiversity rehabilitation. This is due to inadequate benchmarks for target values of pollutants' residues in the environment and the fact that regulators, oil companies and communities have not taken concerted action to implement oil spill responses and remediation in a timely manner. The methods and regulatory standards for biodiversity and habitat rehabilitation have also not been adequately established. In carrying out the post disaster activities in the study area, the outcome of the study indicated that the major role played by the community is the provision of man power needed for the activities. Other role played by the communities includes providing a conducive environment for clan-up activities as well as providing the necessary information as regards to the spilled event. According to

the IUCN Niger–Delta Panel (2013), community stakeholders are eager to be part of remediation activities and felt it was unacceptable that they were excluded from decisions with such far-reaching impacts on their environment and communities.

The statistical analysis to establish that the states studied have similar response and recovery practices. The outcome showed similarity with the opinion of Ogbenetega et al. (2021) which asserted that responses to oil pollution are similar among many oil companies; however, the procedure varied from community to community as did its impact on the culture and practices.

Conclusion and Recommendations

Oil spillage disaster through vandalism, mechanical failure and other related causes is a phenomenon that has thrived especially in the Niger Delta region of Nigeria, where crude oil is produced both on-shored and off-shored. Therefore, having an effective oil spill management program is paramount to the affected population and the sustainability of the environment both for the present and future use. Having considered various post disaster management practices available in some of the major oil producing states and communities in the Niger Delta region of Nigeria, the study therefore concluded that there is need for synergy among all the multi-agency involves in oil spill management for effective response and recovery practices towards oil spillage. The role of community engagement in oil spill management must be duly considered in various management programs that will ensure sensing of belonging and rightful engagement and representation.

References

Adekola, J., Fischbacher-Smith, M., Fischbacher-Smith, Adekola, O. (2017). Health risks from environmental degradation in the Niger Delta, Nigeria. *Environment and Planning C: Politics and Space*, 35 (2), 334–354 DOI: 10.1177/0263774X16661720

Afolabi, O. O., Jumbo, S. A. and Orji, C. M. (2023). CART Survey Application in Assessing Community Resilience towards Hazard-Induced Urban Community. *International*

*Journal of Advance Studies in Human Sociology and Sci*ence, 12 (1), 9-21. https://doi.org/10.22034/IJASHSS.2023.361159.1109

Bello, O. M. and Olukolajo, M. A. (2016). Adequate Compensation as a Tool for Conflict Resolution in Oil Polluted Wetlands of Niger Delta Region of Nigeria. *3rd International Conference on African Development Issues* (CU-ICADI 2016) ISSN:2449-075X

Ebegbulem, J. C., Ekpe, D and Adejumo, T. O. (2013). Oil exploration and poverty in the Niger Delta Region of Nigeria: A critical analysis. *International Journal of Business and Social Science,* 4 (3); 279

Egbe, R. E., and Thompson, D. (2010). Environmental challenges of oil spillage for families in oil producing communities of the Niger Delta Region. *Journal Health, Environmental and Resources,* 13, 24-34

Ekwo, U (2011). C0llaboration-based management of petroleum pipelines rights of way in Nigeria. Newcastle university school of Architecture and landscape

Emelu, V. O., Emelu, C., Babatunde, B. B., Wali, E., Afolabi, O. O. (2023). Associated disaster risk of inadequate corrosion control (cathodic protection) on pipelines in port Harcourt, Nigeria: A quantitative approach. *Journal of Engineering in Industrial Research*, 4(1), 22-30, https://doi.org/10.22034/jeires.2023.1.3.

Emelu, V. O., Eludoyin, O. S. & Oyegun, C. U. (2021a). Preparedness and mitigation for oil and gas pipeline vandalization in the Niger Delta region of Nigeria. *Environmental Management and Sustainable Development,* 10(4); doi:10.5296/emsd.v10i4.18982

Emelu, V. O., Eludoyin, O. S. & Oyegun, C. U. (2021b). Causes of oil and gas pipeline vandalism in the Niger Delta region of Nigeria. *Journal of Research in Environmental and Earth Sciences*.

Energy Information Administration (EIA) (December 2013) available at: http://www.eia.gov/countries/cab.cfm?fips=ni (last visited 21 July, 2014) [EIA Report].

Idowu, O. F. (2012). Niger Delta Crisis: Implication for Society, and Organizational Effectiveness, *British Journal of Arts and Social Sciences*, 100 (7).

Ingelson, A. and Nwapi, C. (2014). Environmental Impact Assessment Process for Oil, Gas and Mining Projects in Nigeria: A Critical Analysis. *Law, Environment and Development Journal,* 10 (1), 35-41

Maitland, A. and Chapman, M. (2014). Oil spills in the niger delta: Proposals for an effective non-judicial grievance mechanism.

Okeowo, A. (2014). Oil Thieves of the Niger Delta, Business Week (20 February, 2014) available at: http://www.businessweek.com/articles/2014-02-20/nigerias-delta-oil-thieves-scrape-out-a-precarious-living.

Okoye, C. O. and Okunrobo, L. A. (2014). Impact of oil spill on land and water and its health implications in Odu-gboro community, Sagamu, Ogun State, Nigeria. *World Journal of Environmental Sciences & Engineering*, 1 (1), 1-21

Onyegeme-Okerenta, B. M., Oharisi A. O., and Wegwu, M. O. (2017). Evaluation of the impact of crude oil spillage on soil and cassava plant (*Manihot esculenta*) in Uzere, Isoko south LGA of Delta State Nigeria. *Journal of Environment and Earth Science*, 7 (5), 137

Shittu, W. J. (2014). Mapping Oil Spill Human Health Risks in Rivers State Niger Delta Nigeria. University of Nottingham

United Nations Environment Programme, (UNEP) (2011). *Environmental Assessment of Ogoniland.* Nairobi. Kenya: United Nations Environment Programme.