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Perception of negative externalities emanating from oil and gas exploitation in Nigeria

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ABSTRACT

This study investigated the perceived negative externalities emanating from oil and gas exploitation in Nigeria. This study is based on the sampling of 446 respondents from 15 rural communities in the oil producing areas of Southern Nigeria. The ordered probit regression analysis was used to estimate the statistical model that describes the relationship between socioeconomic characteristics of the respondents and their perception of the negative impact of oil and gas resource extraction; on selected natural resource variables such as land, air quality, forest resources and water resources. The descriptive results suggest that people in areas; where natural resources are extracted are exposed to 'very high impact' of resource exploitation. This is indicated by the result of the respondents' ranking of negative impacts of oil and gas extraction on natural resources as; such as land (64.3%), air quality (35.9%), forest (58.7%) and water (59.9%). The model estimates suggest that; in particular, rural farmers and fishermen are most likely to be the most vulnerable groups and perhaps mostly affected by the implications of the resource exploitation. Thus, the study recommends that all stakeholders in the oil and gas industry should play their part towards ensuring mitigation of the resource use impacts in oil producing areas. This would particularly benefit farmers and fishermen in rural communities and coastal areas where resource exploitation mostly takes place. The government should show greater commitment towards ensuring strict compliance of firms towards adhering to standard environmental protection policies and best practice in the oil and gas industry.

Keywords: Externality; negative externalities; Nigeria, oil and gas; resource curse; resource exploitation
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Introduction

Environmental issues have dominated various global debates in recent years. These include climate change result of global carbon emission leading to global warming, flooding, drought, desertification and carbon emission problems (Ukpong & Obok, 2018). The need to ensure environmental sustainability has increased over the last few decades, especially following increased evidence of environmental degradation and the worrisome issues of climate change (Bhau & Ukpong, 2018). Also, there is unprecedented upsurge in world population coupled with increased industrialization which

poses persistent pressure on the environment and natural resources. Unfortunately, while few nations have established environmental protection laws, majority of developing countries still struggle with loose environmental protection laws and weak enforcement of the laws coupled with inconsistent policies which render them vulnerable to resource exploitation with consequent externalities (Wu *et al.,* 2024). Where these laws are established, there seems to be comparatively very weak implementation or lack of political will by the government to strictly implement the laws, coupled with issues of sabotage (Abdul-Baki *et al.,* 2024).

Again, where the On the part of other stakeholders involved in the exploration and extraction of these resources, primarily multinational companies, there are obvious cases of exploitation without regards to resource sustainability and efficient management. This is obviously to the detriment of the local population (Ukpong & Obok, 2018). Thus, poor regulation of resource extraction creates both deliberate and unintentional externalities; which are the subject of this study. The concept of externalities is a controversial political and economic issue based on the works of Alfred Marshall and Arthur Pigou, and links to issues of costs, market failure, and trade-offs between reducing environmental impact or human health costs of public goods (environmental resources), and cost of implementing mitigation measures (Sandmo, 2015). Resource extraction is a lucrative economic activity which every nation would wish to undertake, but poor management and refusal to operate under established best-practice often create negative externalities and manifestation of 'resource-curse' scenarios.

Externalities often considered as a third-party effect or spill over effect occurs when people's livelihood, happiness, or profits of firms (or industry) depends upon the incidental or unintended consequences of some activities of others (Sun & Daniels, 2016). These include pollution caused by companies (e.g. oil and gas companies) wastes, effluents, or spills on land or into the waters, which can affect farming, fishing, food safety and food security. Other basic concepts and models describing externalities can be found in (Johansson,1987). Such incidents affect the resources and people who depend on the resources for economic reasons. Unlike marketable goods, the market is limited in assigning prices to environmental impacts, public goods, people's satisfaction, health costs and suffering (Freeman *et al.,* 2014). Most countries in their quest for economic development impose persistent pressure on the environment, creating externalities which in turn affect people's livelihoods and health. China is an example which, following its rapid economic growth faces worrisome environmental pollution and human health issues (Zhao *et al*., 2014).

Oil bearing communities, most of which are rural areas, or isolated settlements along coastal or forested areas, such as those within the Niger Delta region in Southern Nigeria, remain vulnerable to imminent threats and uncertainties of environmental and livelihood issues associated with crude oil and gas exploration and drilling (Kadafa, 2012). These externalities need to be managed through adequate commitment by all stakeholders to operate under well-established and properly monitored sustainable environmental regulations. The need to balance the criticality of achieving strict compliance with these regulations to protect the environment against the benefits earned by companies that exploit the resource and people who depend on the resource for their livelihood; raises the issue

of management of externalities (Unger, 2014). For instance, one age-long (and routine) type of pollution from the oil and gas industry is air pollution (mainly from gas flaring), which poses environmental and human health issues and incurs costs (Zheng *et al.*, 2014; Brandt *et al.*, 2013). Oil drilling poses a complex issue of debates about trade-offs between its benefits and negative externalities (impacts). An example is that of the explosion of the deep-water Horizon oil drilling rig in the Arctic Alaska outer continental shelf (Hults, 2014). Ite *et al*. (2013) noted that while petroleum (oil and gas) business bring improvement to a country's national economy, such as Nigeria, oil extraction has detrimental impacts on the local economy, environment and people's livelihood.

These externalities point to the 'resource curse paradox' which has led to emergent global concerns and debates in recent years (Brunnschweiler & Bulte, 2008). In particular, the dangers of oil extraction, mainly pollution from oil spills have attracted increased media attention and international debates (Lindén & Pålsson, 2013). In Nigeria, there has been increasing debates and concern over the poorly monitored activities of the O&G (petroleum) industry, which would help control the impacts of the industry (Nnadi *et al*., 2014; Raji & Abejide, 2014). The resource curse concept not only reflects the dangers of resource extraction, but also the inability of markets, and stakeholders (such as the government and petroleum industry in this case), to balance the trade-off between the negative impact and benefits of the resource. Obi (2014) linked the facts behind oil extraction and its supposed benefits to the political economy of the resource curse, which has caused conflicts in oil-producing areas. Santos (2012) noted civil disobedience, strikes and demonstrations as some of the actions of individuals or groups in a bid to put pressure on the government and corporate bodies (such as O&G companies) to change their behaviour to reduce negative impact. This fact is corroborated by the report that most oil rich areas, such as the Niger Delta have decried marginalization, and poor benefits from the proceeds of oil (oil wealth), which has resulted in violent protests and other acts of insecurity in the region (Kew & Philips, 2013; Ukeje, 2015; Mohammed *et al.*, 2014).

In developed countries, such as the USA, both pre-hazard and post-hazard assessments of resource extraction are always debated, with a well-developed master plan to which all stakeholders are bound and judiciously follow. For instance, there has been a long debate on the circumstances of oil drilling in the Artic and Lofoten in northern Norway (Hauge *et al*., 2014; Keil, 2014; Smits *et al.,* 2014; Hasle *et al.,* 2009). While externality conceptualises issues of the impacts of resource extraction and market failures, resource curse paradox depicts the imbalances and inequality between resource benefits and consequent impacts of resource extraction. More so, alternative literature on resource curse suggests that it may be a red herring and not a paradox. The view that abundance of resources leads to slow growth or bad institutions may not be correct. This is because the empirical studies supporting the resource curse view have a faulty measure (proxy) for resource abundance. These recent studies conclude that weak institutions lead to dependence on resources and not the other way round (Brunnschweiler & Bulte, 2008). Where markets fail to ensure appropriate price for environmental resources (or public goods) in the event of an externality, (and in most cases the government also fails to implement relevant mitigation policies), the environment and people bear the burden of the

damage (Garrod & Willis, 1997). Such failures can however be corrected by an appropriate tax policy (Sandmo, 2015).

For instance, a damaged environment (or polluted environmental resource) creates uncharged cost or loss, which might include cost of injury or health treatment, loss of livelihood, and in some cases, where pollution triggers unemployment and poverty, the community remains vulnerable to crimes, and moral degeneration. Indeed, poor management of externalities often triggers manifestation of the resource curse paradox, for instance violent conflicts and negative feelings about a resource among the people, and can result in protest, for example, the Deepwater horizon oil well explosion created a negative externality which led to reduced support for oil drilling by the people (Lilley & Firestone, 2013). In particular, a history of poorly managed externalities of oil and gas extraction has created a bad perception about the resource and depiction of the industry as an agent of resource curse (or evil instead of a blessing) (Azaiki, 2009). It is thus important that stakeholders involved in resource management should guarantee delivery of safe operations and minimize surface footprints of their activities (West & Krzewinski, 2014).

Where externalities are already obvious, committed efforts should be made to carry out appropriate mitigation measures, such as clean up in the case of oil spills, and recovery of the environment, as in the case of bioremediation, alongside providing commensurate economic shock absorbers, such as compensation to the affected people (Roy *et al.*, 2014; Ukpong & Obok, 2018). In other words, stakeholders should internalize the burdens or repercussions of externalities generated by the firms which may be in the form of compensation (Endres & Friehe, 2014). Managing externalities requires involvement of all stakeholders, including the general public, driven by a well-structured government policy or regulations, to which all parties must strictly adhere (Portman, 2014). This study was conducted in the Niger delta region in southern Nigeria, as part of the broader research involving Choice experiments and modelling of environmental and socioeconomic impacts of oil and gas extraction in Nigeria. The Niger delta region consists of areas where the bulk of crude oil and gas are drilled in Nigeria. The study largely focused on the resource curse issues, in terms of its emphasis on people's perceptions of impacts of the oil and gas resource extraction and captures elements of externalities which exacerbate the resource curse feelings among rural population in crude oil producing areas.

In particular, the study was designed to evaluate public perceptions of the impact of crude oil extraction on selected environmental resources such as land, air quality, forest resources and water resources. The study also established the statistical inferences from the relationship between socioeconomic characteristics of people in the oil producing areas and their perception of the impacts of resource extraction using selected natural resource variables such as land, air quality, forest resources and water resources. The irony is that resource extraction by most industries in the developing countries does not adhere satisfactorily with global best practices, hence creating obvious scenarios of resource exploitation rather than meeting an optimum within which the environment and rural population are not made worse-off in the course of resource extraction. Reaffirming the inseparable correlation between the livelihood of rural population and environmental resources, the broader aim of this inquiry was to reiterate the need for environmental sustainability by

drawing an insight for constructive debates and policies toward mitigating undesirable externalities and resource-curse ambiguities caused by environmental resource extraction in developing countries.

The specific objectives of the study include describing the socioeconomic characteristics of the respondents and their distribution based on their perception/ranking of the negative impacts of oil and gas extraction on natural resources in the study area. The study also aims to carry out ordered probit model estimation for People's perception of the impacts of the oil and gas industry. The major research question helped to identify/suggest the implications of the negative impact of extraction on the socioeconomic characteristics of the respondents, with the hypothesis that 'there was no significant different in the impact of extraction on the socioeconomic characteristics of the respondents.

Materials and methods

Study area

This study was carried out in the Niger Delta region of Southern Nigeria where the bulk of the country's crude oil and gas is being extracted. Niger Delta region is made up of nine (9) states, characterised by a large terrain of mangrove forest supported by rivers and rivulets, and the coastal linings of the Atlantic Ocean (Kuenzer *et al*., 2014). The region consists of a large proportion of rural population who depend largely on the natural environment (Ukpong & Obok, 2018).

Sampling techniques and sample size

This study used a sample size of 450 respondents; selected from 15 communities (5 communities selected in each of 3 States); but responses from 446 respondents who adequately completed the questionnaires, were suitable and used for the analysis. A multi-stage sampling technique was used in selecting the states and communities for the study. Selection of participants for questionnaire survey was not entirely random; as inclusion of certain socioeconomic characteristics such as gender and occupation was taken into consideration in the selection process. Thirty (30) respondents were selected in each of the communities to participate in the survey through face-to-face interviews, after a random starting point in each community. Five groups of communities were selected from three oil producing states in Nigeria including: Rivers State (*Chokota community, Igbo-Etche, Alesa-Eleme, Oyigbo, Biara*); Bayelsa State (*Odi, Imiringi, Etiama, Okotiama-Gbarain, Ogboibiri*); Akwa Ibom State (*Edo, Iko, Mkpanak, Unyenge, Ukpenekang*). A Map of Nigeria showing States, including the three states selected for the study is presented in Plate 1.

Data collection

Data were collected through administration of questionnaires directly to the respondents. Questionnaires distri was done with the aid of trained field assistants accompanied by two community volunteers, who were basically people conversant with the communities. Analysis was based on four attributes namely; land, air quality, forest resources and water resources. A five-point Likert scale was used for the perception rating.

The ordered probit regression analysis was used to determine the influence of respondents' socioeconomic characteristics on their perception of the impacts of crude oil extraction by the oil and gas industry.

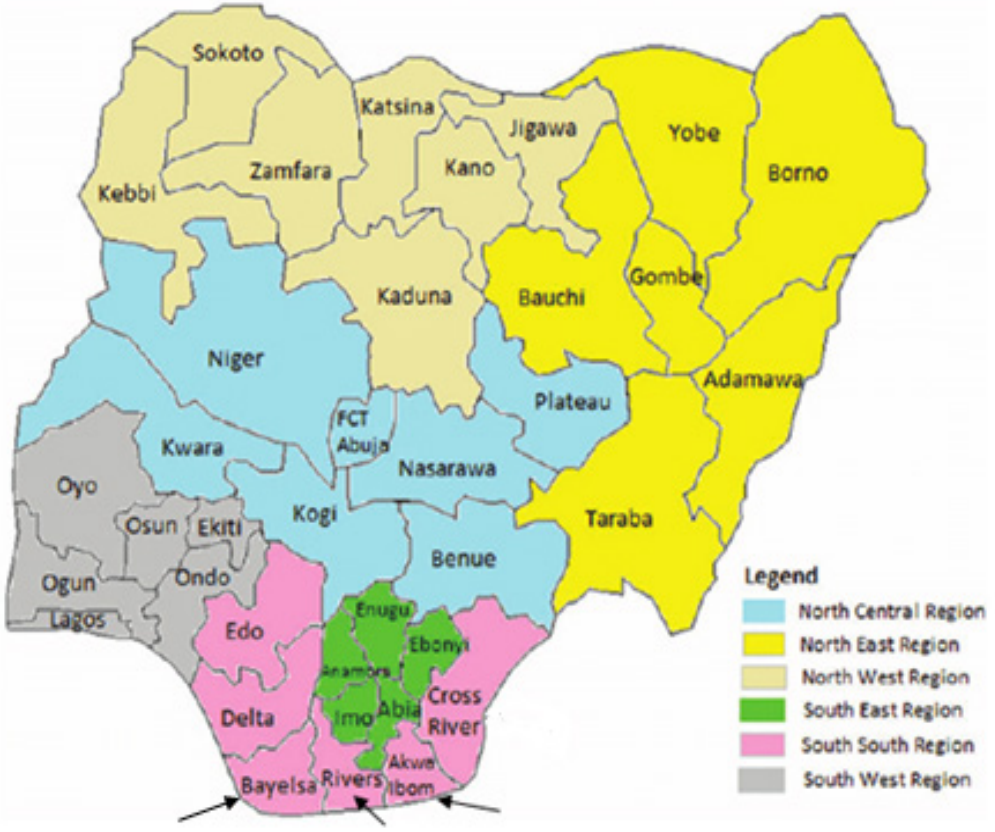

Plate 1: Map of Nigeria showing States, including the three states (Akwa Ibom, Rivers and Bayelsa) selected for the study. Source: https://nigeriapostcodes.com/

Data Analysis

The ordered probit analysis was used to evaluate the influence of socioeconomic characteristics on people's perceptions (or concerns) about the consequences of oil and gas production in the region. Ordered probit analysis was used because the responses (dependent variables) were discrete and ordinal. Six socioeconomic variables were used as explanatory variables in the analysis; educational level (EDU), family size (FSI), age (AGE), monthly income (INC), gender (GEN) and occupation (OCC). The apriori expectation was that people's perception of negative externalities of oil and gas exploitation might be influenced by these characteristics. The dependent variables (for instance, the thresholds of perception) were ordered from 1 to 5 and designated as 'thresholds", with the highest number indicating highest levels of the dependent variable (highest level of perceived impact). The analysis was carried out using the Statistical Package for Social Sciences (SPSS). The independent variables were specified either

as factors or covariates, with every last variable set as a reference variable in the model.

Explanatory variables considered as factors in the analysis, include explanatory variables that are categorical (and ordered responses), such as gender, educational level and occupation. Covariates include explanatory variables that are continuous, such age and monthly income, as well as family size specified as discrete. The factor forms of the variables allow for estimations of the specific categories of the variables, while the covariate form of the variables allow for the estimation of the coefficients of the variables as a whole. This means that the factor form allows the analysis of the specific statistical relationship of the different categories or levels of a given variable(s) with the dependent variable, while the covariate form allows the estimation of the collective statistical relationship of the independent variables with the dependent variable. The descriptive statistics of the variables are presented in Table 2.

Results and discussion

Rating of Impacts of the oil and gas extraction on natural resource variables

As shown in Table 1, the result shows that majority of the respondents perceived that oil and gas exploitation by the oil and gas industry has very high impact (negative effect) on environmental resources, including land, water resources, forest resources and air quality respectively.

TABLE 1

Perception of negative impacts of oil and gas extraction on natural resources

Levels of impact	Natural Resources & Environmental Attributes			
	Land	**Air quality**	**Forest**	**Water**
Very high impact	287(64.3%)	160 (35.9%)	262 (58.7%)	267 (59.9%)
High impact	111(24.9%)	144 (32.3%)	115 (25.8%)	99 (22.2%)
Moderate impact	26(5.8%)	72 (16.1%)	40 (9%)	47 (10.5%)
Low impact	20(4.5%)	48 (10.8%)	20 (4.5%)	25 (5.6%)
No impact	2(0.4%)	22 (4.9%)	9 (2%)	8 (1.8%)

Note: Figures indicate number of respondents. Figures in Parenthesis represent percentage of respondents. Total number of respondents (N) = 446.Impact implies negative effect on the selected variables

The result above shows that a slim majority of the respondents indicated that oil and gas extraction has very high negative impact on air quality. From the result, majority (68.2%) of the respondents were above the mid-point of rating scale (moderate impact) indicating higher levels of negative impact of oil extraction on air quality in the study area. However, the comparatively low number of respondents indicating the highest level of negative impact on air quality; may be attributed to poor awareness or poor knowledge of what constitutes air quality and perhaps the poor knowledge of the various consequences of poor air quality among the respondents. Air pollution is one of the inherent risks of oil and gas extraction, mostly triggered by gas flaring (Aktar *et al.,* 2024; Jimoh *et al.,* 2024), and

Nigeria flares more gas than any other country in the world (Adegoriola *et al.,* 2024). Gas flaring contributes to climate change and has been identified among the main concerns of the people as a major source of air pollution (Ejiogu*,* 2013). The widespread location of gas flaring sites across Southern Nigeria where the bulk of oil and gas is extracted; suggests the reality of poor air quality in the region, also suggesting that people in the region are prone to negative impacts of air pollution which includes health risks and climate change issues (Ukpong, 2019).

From the overall results, it is almost indisputable that despite the positive economic benefits of the crude oil deposits, the oil and gas extraction and other operations of the oil and gas industry remain a major threat to the survival of people and environmental sustainability in Nigeria. These perceptions also confirm the resource curse concepts of natural resources, where certain groups of people feel worse-off because of increased activities of the oil and gas industry that have negatively impacted on their livelihood as also highlighted by (Ukpong *et al.*, 2017; Ukpong, 2019). The forest forms an important part of the Niger Delta where the bulk of Nigeria's oil and gas is extracted and serves as a major source of livelihood for majority of the rural people, providing food, income and employment (Aghomi & Berezi, 2024). Resource extraction is a threat to the forest, in fact, there is serious concern about forest degradation (forest clearance) in areas where resources are extracted (Bhau & Ukpong, 2018). This concern is also reflected in the result shown in Table 1, which shows that majority (58.7%) of the respondents perceived that oil and gas extraction has very higher levels of impact on the forest in areas where extraction activities take place. The implication of this result is that people who depend on the forest for their livelihoods could be vulnerable to loss of income, hunger and poverty. The obvious fact is that, forests in many developing countries are being increasingly destroyed, creating a risk of imminent environmental problems such as ecological imbalances, global warming and other climate change menace.

Resource extraction and its consequent externalities such as pollution, facility explosion and forest clearance pose a hindrance to ecological performance and affect the resilience of the environment, and the impacts of oil pollution on the forest and other ecological resources, mainly as a result of an oil spill and explosion have also raised global concerns as shared by (Bhau & Ukpong, 2018; Hong *et al.,* 2014). Unlike other developing countries where mining or extraction of certain environmental resources are majorly onshore, Nigeria's oil and gas is also largely extracted in areas located along the coastal ranges of the Atlantic ocean, and with close proximity to water resources (including rivers, streams and ponds), with extensive fresh water swamps, which serve as traditional sources of drinking water for rural communities, and support for diverse economic activities including farming, fishing and transportation (Anejionu *et al*., 2015). As indicated in Table 1, a large majority (82.1%) of the respondents perceived that O&G extraction has higher levels of impact on water resources in oil producing areas. Without exaggeration, extraction of environmental resources within coastal areas most often results in contamination of water resources either directly or as a result of erosion. This contamination or pollution normally affects fishing which is a traditional occupation of most people in the coastal rural areas.

Description of Variables

TABLE 2
Descriptive Statistics of Variables used in the Ordered Probit Analysis

Variable	Label	Description and coding	Mean	Standard Deviation
Gender	GEN	Gender specifications of the respondents 1 = Male 0 = Female	0.65	0.48
Educational Levels	EDU	Educational status of the respondent 1 = Formal education 0 = Non-formal education	0.86	0.35
Age	AGE	Age of the respondent ranging from 18 – 64 years, labelled as a continuous variable (Covariates).	40.04	11.01
Family size	FSI	Family size of respondent ranging from 1 to 10 people, labelled as a continuous variable (Covariates).	4.08	2.25
Income	INC	Monthly income of respondents ranging from N750 to N150000, labelled as a continuous variable (Covariates).	23952.30	26678.78
Occupation	OCC	Occupation/occupational status of the respondents OCC 1 = Farming (15%); OCC 2 = Government worker/Civil servant (17%); OCC 3 = Oil company worker (7%); OCC 4 = Other company worker (6%); OCC 5 = self-employed (26%); OCC 6 = Unemployed (11%); OCC 7 = Student (15%); OCC 8 = Fishing (3%).	4.20	2.14
Thresholds		Levels of impacts (ordinal data form) 1 = No Impact; 2 = Low Impact; 3 = moderate Impact; 4 = High Impact; 5 = Very High Impact		

Note: Last variables are set as base or reference variables in the model. For instance, OCC=8 (fishing) was set as base (or reference) variable for occupation

Four variables used for the analysis include; land available for agriculture (ILD), forest (IFR), water quality (IWT) and air quality (IAQ). The variables were chosen being major environmental resources reported to be affected by impact of environmental pollution, as previously highlighted. The description of the socioeconomic variables is presented in Table 2. The different levels of perceived impact are designated as 'Thresholds', such

that a higher threshold level represents a high level (or severity) of impact, these include; threshold = 1 (no impact), threshold = 2 (low impact), Threshold = 3 (moderate impact), Threshold = 4 (high impact), and Threshold = 5 (very high impact). Severity of the dependent variable, the levels of impact increases from 1 (no impact) to 5 (very high impact), hence, a positive coefficient will suggest the likelihood of a higher level of impact (or more severe impact). High levels of impact, therefore, represent high negative impact on the variable specified. In other words, higher levels of impact imply severity of negative effects. The goodness-of-fit information (Likelihood index and R^2 values) and other parameter estimates of the ordered probit models are presented in TABLE 3.

Respondent's Perception of Impacts of the O&G Industry

TABLE 3
Ordered Probit Model Estimation for People's perception of the impacts of the O&G industry

Variable	ILD	IAQ	IFR	IWT
	Coefficient(SE)	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)
AGE	0.023(0.008)*	0.000(0.008)	0.010(0.008)	0.006(0.008)
FSI	-0.052(0.035)	0.026(0.032)	-0.009(0.033)	0.012(0.035)
INC	6.96E-7(3.2E-6)	-1.17E-6(3.E-6)	-2.07E-6(3.07E-6)	2.44E-6(2.1E-6)
GEN = 0	-0.017(0.126)	-0.325*(0.113)	-0.042(0.118)	-0.047(0.119)
EDU = 0	0.163(0.218)	-0.324***(0.172)	0.164(0.191)	0.085(0.189)
OCC = 1	1.484*(0.452)	0.470(0.322)	0.070(0.380)	-0.604(0.495)
OCC = 2	-0.039(0.383)	0.002(0.345)	-0.468(0.394)	-1.151**(0.506)
OCC = 3	-0.120(0.407)	0.346(0.373)	-0.073(0.425)	-0.935***(0.528)
OCC = 4	0.065(0.411)	0.082(0.370)	-0.673(0.415)	-1.447**(0.522)
OCC = 5	0.019(0.342)	1.019*(0.314)	-0.239(0.360)	-1.108**(0.478)
OCC = 6	-0.016(0.376)	0.116(0.339)	-0.235(0.391)	-1.100**(0.501)
OCC = 7	-0.099(0.378)	0.123(0.343)	-0.506(0.391)	-1.094**(0.503)
-2Log Likelihood	785.804*	1073.739*	942.117*	959.433*
Pseudo R^2				
Cox & Snell	0.134	0.127	0.063	0.059
Nagelkerke	0.157	0.138	0.070	0.066
McFadden	0.075	0.053	0.029	0.027
Observations	446			

Note: OCC =8 (fishing) was set as base or reference variable for occupation*; ILD = Impact on land, IAQ = Impact on air quality, IFR = Impact on forest resources, IWT = Impact on water. Asymptotic standard errors (SE) are in parentheses. Levels of significance: *** P ≤ 0.10; ** P ≤ 0.05;*
** P ≤ 0.01. Threshold specifications: 1 = No Impact; 2 = Low Impact; 3 = Moderate Impact; 4 = High Impact; 5 = Very high Impact*

As shown in table 3, one of the notable findings of this study is indicated by the negative and significant coefficient of EDU (educational level) indicating that more educated respondents compared to those without formal education perceive as very high the negative impacts of the oil and gas industry on air quality. Against apriori expectation that respondents do not need to be educated in order to appreciate that their air quality has become offensive as a result of the oil and gas activities, the result suggests that while there are reported poor quality of air in these areas, majority of the people particularly non-educated people might be ignorant of the issues associated with air pollution. This result corroborates the findings by (Ukpong & Obok, 2018), which indicated that majority of people in oil producing communities may not have in-depth knowledge of the effects of air pollution caused by gas flaring. Recall that OCC=8 (fishing) was set as base or reference variable for occupation; though the positive significance of OCC = 5 (self-employed) against the perception of fishermen cannot be substantiated, the negative but significant results under IWT (Impact on water) suggests that fishermen more than others may have been comparatively more affected by the impact of resource exploitation on water resources. This finding corroborates findings of (Ukpong *et al*., 2017), and are however not questionable, owing to the fact that fishermen survive mainly on water resources for their food and income.

The estimates also indicate that comparatively older people perceived as very high, the impact of the industry on land, which could be due to a long history and experience of these impacts in the area. The estimates also show a positive coefficient of OCC = 1 (farming), for ILD (impact on land) indicating a perception of higher impact on land among farmers compared to fishermen, suggesting that compared to fishermen (and perhaps, other occupational groups), farmers may either be more vulnerable or actually most affected by these impacts. This finding corroborates with the report by (Ukpong *et al*., 2017), and may be connected with the fact that farmers suffer greater losses during explosion and oil spills on land, as reported above. Notably, there is no significant difference in the perceptions of respondents on the impact of the oil and gas industry on forest resources. This result cannot be substantiated, however a large number of rural population depend largely on forest resources for their livelihood; including hunting of wild animals, gathering of wild fruits, lumbering, etc. It is important to also note that Nigeria has a loose or poorly implemented forest conservation laws, hence rural population in particular who live close to the forest freely exploit forest resources for their livelihood. Therefore, negative impacts of oil and gas operations are most likely to impose negative externalities on the people. As also emphasized by (Ukpong & Obok, 2018), there are obvious negative implications of natural resource exploitation, particularly for the rural population who almost solely depend on the natural environment for agriculture (food production), forestry, medicinal herbs, hunting and fishing, as their main sources of livelihood.

Conclusion and Recommendation

This study evaluates people's perception of the negative externalities of oil and gas exploitation in Nigeria. Findings of this study strongly suggest obvious vulnerability of users of environmental resources to exploitation in areas where natural resources are being extracted. The exploitative activities of resource extracting firms cannot be unconnected

with poor resource management and poor enforcement of environmental policy tools by the government in Nigeria. In particular, findings of the study indicate that crude oil and gas resource extraction has very high negative impacts on the environment and rural population who largely depend on the environment for their livelihood. The study further strongly suggests that farmers and fishermen may be mostly affected by the negative impacts of environmental resource exploitation. These results point to very high negative human and economic impacts to which farming and fishing households might be the most affected. By inferences, the study suggests in a broader perspective that Nigeria might be battling with consequent externalities of poorly regulated resource exploitation which may have imposed indescribable livelihood and environmental problems that directly affect human survival and environmental sustainability.

On a general note, the persistence of environmental and livelihood problems in oil producing rural communities in Nigeria, strongly suggests gaps in the management of natural resource extraction, and creates doubts on the competence of existing policies and measures adopted by the government and firms toward mitigating the negative impacts of resource extraction. It also questions the supposed satisfactory delivery of corporate benefits to the people who face direct impacts of resource extraction. In other words, the findings of this study suggest apparent laxity in the way the government handles and monitors operations of resource extracting firms, and perhaps lack of political will to punish defaulting companies, which has culminated into a backlog of negative impacts, abuse of the environment and economic burden on the people. It is also worthy of note that government's lack of stringency in monitoring the activities of O&G firms amounts to negligence on the part of the government and deprivation of people's right to a safe and economically viable environment. It is thus, obvious that Nigeria and other developing countries are somewhat unable to sustain the fight against resource exploitation by both local and multinational firms operating under a very porous and loose policy environment.

Nevertheless, like other nations, Nigeria plays critical roles influencing sustainability of the ecosystem, with significantly massive vegetation, forests and comparatively large population of rural people who largely depend on the natural environment for their survival and economic wellbeing. Adequate management of natural resources in Nigeria would not only improve the livelihoods of the people who directly depend on ecosystem services for their survival but also contributes to the solutions of global climate change issues.

We recommend;

i. The Nigerian government should consider strengthening policies and employing more rigorous measures to adequately monitor oil and gas drilling operations and extraction of other natural resources in the country (both in the onshore and offshore environment).
ii. Resource extracting companies should make efforts to improve their corporate responsibilities and equitably spread benefits of the resource to help mitigate the negative externalities of resource extraction in the oil-producing areas.
iii. There is a need for proper impact assessments and adequate enforcement measures to enhance proper management and use of natural resources in oil producing areas.

iv. There is a need for future research. This study is however limited by the use of cross-sectional data which limits the assumptions of causal relationship between the dependent variables (perceived impact on environmental resources) and the independent variables (socioeconomic characteristics), thus portraying more of a correlational relationships.

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