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Research Article

SOCIOECONOMIC EFFECT OF CRUDE OIL EXPLORATION IN ANAKPA URUAN INDUSTRIAL COMMUNITIES OF AKWA IBOM STATE, NIGERIA

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A R T I C L E I N F O

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VR = Village Road, FR = Farm Road, ER = Ekpe Obo Road, IR = Intake Inyang Road, SC = Shell Camp,

A B S T R A C T

Socioeconomic Effect of crude oil exploration in industrial Area of Anakpa communities in Uruan Local Government Area of was investigated in Akwa Ibom State, Nigeria. The essence was to determine the effect caused by crude oil exploration and exploitation activities in the affected industrial communities of Anakpa in Uruan Local Government Area of Akwa Ibom State, Nigeria. The study was undertaken between March-2016 and March -2018. Qualitative method which entails the use of questionnaires was employed to ascertain the effect of crude oil exploration in the affected communities. In view of the population of the community mentioned four hundred questionnaires were distributed accordingly in the affected community. The results obtained showed that the crude oil exploration activities undertaken by the international organization has brought negative environmental consequences to the affected communities. The remarkable ecological damages recorded over the years in the study areas had been attributed to crude oil exploration in the area. The accidental crude oil spillages recorded in the area has caused severe impact on agricultural activities. The decline in soil fertility and plant growth and development had been attributed to the exploration activities. The gradual decline in surface water quality also was confirmed to be caused by the crude oil exploration activities in the study area. Though however the neighbouring communities was selected as control, but result recorded during the stakeholder meeting with the opinion leaders in the community confirmed that the crude oil pollution does not posed any adverse effect on human health and development at the control site.Aprtfrom the effect mentioned above there was no health effect associated with the exploration activities in the five areas affected by crude oil exploration at the study site.

INTRODUCTION

Akubugwo *et al.* (2016) stated that crude oil as major foreign exchange earner in developing countries had over the years positively and negatively contributed to environmental consequences. As fossil fuels it is used globally as source of energy both in private and industrial settings to generate power (Appenteng *et al*.2013). In view of it geological formation crude oil can be classified as light, medium or heavy (Akubugwu, and Duru,2011). In the course of exploration several processes are undertaken to ensure effective and sustainable drilling from underneath the earth surface. Drilling or prospecting for crude oil occur both onshore and offshore locations (Alkarkhi and Easa,2009). In view of this site preparation is undertaken through the use of motorized and non-motorized equipment to aids in the exploration process.

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The use of these equipment may influence the crude bearing communities negatively because of organic and inorganic substances introduced into biosphere (Chinenyeze and Ekene,2015). Chinenyeze and Ekene (2015) stated that during the exploration process the chemical often used during the drilling process potentially influenced the underground water quality through the introduction of inorganic and organic substances into the underground water quality. Sometimes through surface run-off the surface water is also polluted by these chemical substances. As further mentioned by Chen and Zheng (1999) trace metal in crude oil can occur in organic and inorganic forms as results of interactions with other compounds.

Studies has shown that the accidental spillages, contamination of soil, surface and underground water qualities often occur possibly at the production and processing site during exploration process (Okoro *et al*.,2011). As revealed by Onojake *et al*. (2011) continuous gas flaring is also obvious at the production and processing site. The flared gas is also potentially injurious to the human in view of the obnoxious

gases generated and released into the immediate environment. Dutta *et al*. (2007) reported that the flared gas often remains as sooths easily transported in the atmosphere. As sooths they are easily mobilised and easily adsorbed by plants and deposited on soil. The organic and inorganic constituents in the sooths can also blocked the stomata of plants thereby preventing process of photosynthesis. Eze *et al*. (2014) revealed that depending on the nature, age and type of plant species such organic substances and inorganic substances can bioaccumulate in such plants. Therefore, the effect of these substances in human is relatively important because some of these metals at minimal and maximum concentration is potentially dangerous to humans (Ogbonna *et al*.2009). Ogbonna *et al*.(2009) also indicated that lead (Pb) and cadmium(Cd) released from effluent during crude oil exploration does not have any potential health benefit to human. They are toxic and can lead to severe chronic and acute heath problems in humans in an event of exposure (Ogbonna *et al*.2009). Ogbonna *et al*. (2009) further mentioned that surface water is also polluted with industrial effluent and drilling fluids generated during the exploration and exploitation of crude oil. Potentially the aquatic resources are directly and indirectly affected by such organic and inorganic substances released into the surface water bodies (Appenteng *et al*.2013). In most cases the organic pollutants generated and released into the water bodies had higher chemical oxygen demand a causing depletion in oxygen demand by other aquatic organism in such water bodies (Appenteng *et al*.2013). The introduction of organic and inorganic substances also pollutes the entire soil environment where the exploration is being conducted (). The tendency of trace metals to accumulate in the soil matrix is also obvious (Appenteng *et al*.2013). This can also bioaccumulate in edible vegetable plant species leading to acute and chronic toxicity to humans and animals within these areas (Appenteng *et al*.2013). Therefore, this study was undertaken to determine the socio-economic effect of crude oil exploration in Anakpa with the view of determining the extent of damage done on the Anakpa environment.

Key words*:* VR = Village Road, FR = Farm Road, ER = Ekpe Obo Road, IR = Intake Inyang Road, SC = Shell Camp,

MATERIALS AND METHODS

Study Area

This study was carried out in Anakpa in Uruan Local Government Area of Akwa Ibom State, Nigeria (Figure1). Anakpa is bound to the north by Itu and Ibiono Ibom Local Government Areas and to the East by the Cross-River State. The study site also shares the west boundary with Uyo and Ibesikpo Local Government Areas of Akwa Ibom State, Nigeria (Figure1). The area lies between latitudes and Longitudes 5 ^{0}10' N and 8^{0}3'E in the North and East respectively.

Crude oil exploration and exploitation activities in Anakpa was undertaken onshore by Shell Petroleum Development Company (SPDC). However, production and processing were abandoned after discovery of crude oil at the study site, because of low production volume from the crude oil wells. Currently the operational activities are undertaken by Monopolo Oil and gas production company on concessional arrangement with the Nigerian Nation Petroleum company(NNPC) and Shell Petroleum Development Company(SPDC).

In terms of occupation, majority of people within the study location are peasant farmers. Rainfall in the study area is all year round, more severe in June and September. Due to intensive crude oil exploration, production and processing, Anakpa had recorded severe environmental degradation and other ecological problems due to soil erosion. Accidental spillages recorded over the years also contributed to pollution of soil used for agricultural activities in the area, thereby leading to decline in soil fertility and agricultural output

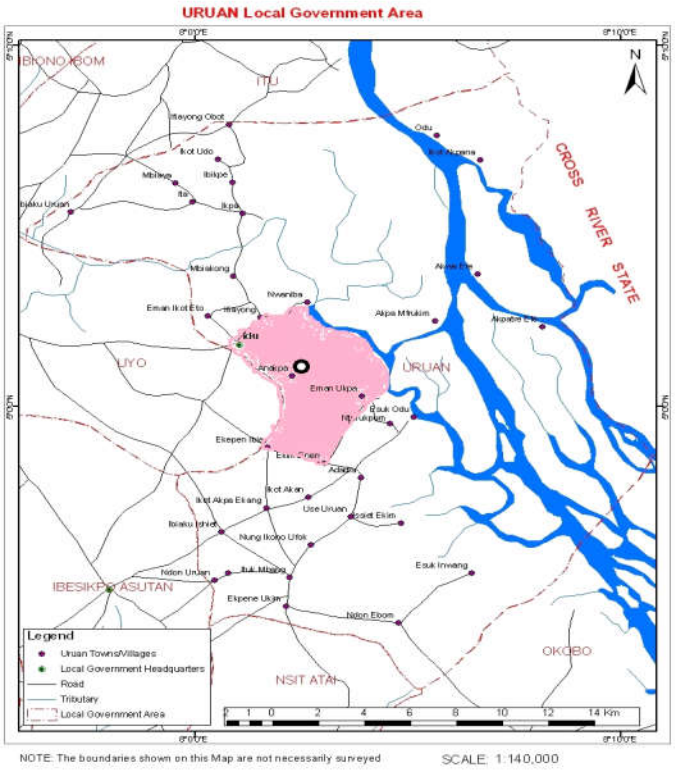

Figure 1 Map of Uruan Local Government Showing the Study Area

Specific Study Site

Experimental Design

A single factorial experimental in randomized block design was utilized for this study. This enabled the selection of the five study sites affected by crude oil exploration. The questionnaires were then distributed based on the target population. In-depth focus interaction was also utilized to ensure full interaction with the stakeholders in the communities affected by the exploration activities. Short and open-ended questionnaires were used to enhance clear understanding of the respondents in the questionnaire

Sample Population and Questionnaires Distribution

In order to administer the study‘s questionnaire the sample size was determined statistically using Yaro Yame Formula for a finite population (Uzoagula, 1998) as follows:

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

n = sample size
N = the finite population
e = level of significance (or Limit of tolerance)
= unity (a constant)
Population of the study area= 6,500.

Subjecting the data to the formula above

n , = 6,500.00, = 400

, $1 + 6500(0.05)^2$

Therefore, with the above results a total of 400 household was involved in the study and the questionnaires distributed accordingly to the affected household.

Statistical Analysis

Data were descriptively analysed for mean and percentage frequencies based on the number of questionnaires received from the respondents according to Appenteng *et al*.,2013; Uzoagula,1998).

RESULTS AND DISCUSSION

Age of Respondents to Crude Oil Effects in Study Locations

Results for bio-data of questionnaire response are illustrated in figure 2 below. Based on results obtained, people above 65 years of age responded yes which is 79.65% of the total 339 respondents within this age limit while 20.35% said no. Out of the total 339 responses obtained, 79.35% of respondents around 50 years said yes while 20.65% said no. 79.83% People between 30 and 45 years of age responded yes while 20.18% said no out of the total 337 responses recorded. Results in figure 48 also indicate that, out 339 respondents within the age bracket of 20 to 29 years 79.65% said yes while a minimal 20.35% responded negatively. At the control site stakeholder meeting prior to the distribution of the questionnaires, participants indicated that they do not have any crude oil wells and as such do not have any effect associated with crude oil activities in their community

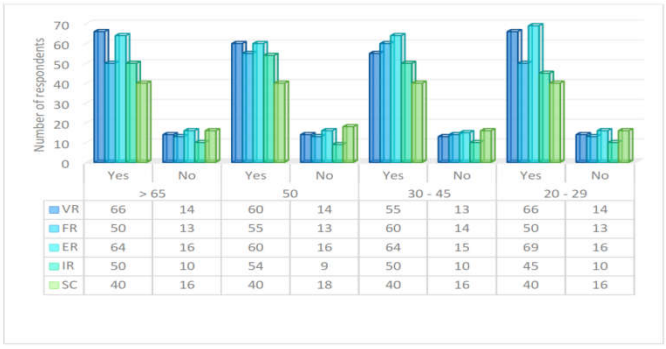

Figure 2: Age of Respondents

Key: VR = Village Road, FR = Farm Road, ER = Ekpe Obo Road, IR = Intake Inyang Road, SC = Shell Camp.

Level of Male and Female Respondents in Study Area

Figure 3 demonstrates the number of male and female respondents. Results obtained showed that out of the total 339 males responded, 270 (79.65%) responded positively while 69 (20.35%) responded negatively. The resu lts also indicated that out of 338 female respondents, 245 (72.48%) said yes while 93 (27.52%) responded negatively. The overall results revealed that out of 677 respondents, 515 (76.07%) said yes while 162 (23.93%) responded negatively.

Questionnaires distribution was not required as they stakeholders mentioned that they do not have any crude oil production activities .As such did not accept the distribution of the questionnaire since they do not have any crude oil related activities in they community.

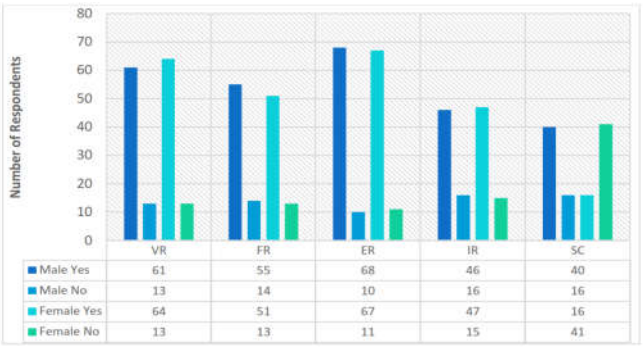

Figure 3: Number of male and female respondents

Key: VR = Village Road, FR = Farm Road, ER = Ekpe obo Road, IR = Intake Inyang Road, SC = Shell Camp.

Educational Qualification of Respondents in Study Locations

Res ults for qualifications of Respondents are demonstrated in figure 4 above. Results obtained showed that those with first school leaving certificate (FSLC) that responded positively are 264 (80. 83%) while 65 (19.17%) of the Respondents said no. Two hundred and seventy - five (275) of the respondents with West African School Certificate (WASC) said yes while 64 (18.88%) responded negatively. Out of 339 respondents with first degree (B.Sc), 276 (81.42%) of them responded in the affirmative while 63 (18.58%) of them responded negatively. Three hundred and thirty nine of the respondents have Master of Science (M.Sc) degree out of which 274(80.83%) said yes while 65 (19.17%) responded negatively.

At the control site stakeholders meeting and in-depth focus interaction the declared that they do not have any crude oil production activities as such the questionnaires were not distributed in view of their assertion.

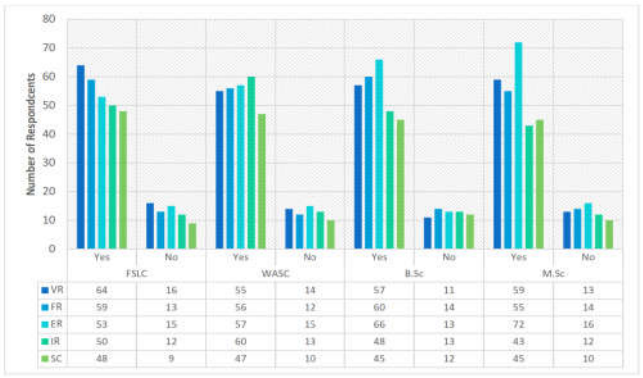

Figure 4: Qualifications of Respondents and their responses

Key: VR = Village Road, FR = Farm Road, ER = Ekpe Obo Road, IR = Intake Inyang Road, SC = Shell Camp

Occupation of Respondents in Study Locations

Figure 5 illustrates the different professions of the respondents and out of 339 artisans, 284 (83.78%) responded positively while 55 (16.22%) said no. Three hundred and thirty - nine of the respondents were Teachers out of which 276 (81.42%) responded positively while 63 (18.58%) of them responded negatively. Two hundred and seventy-nine (82.30%) of the 339 Civil Servants responded positively while 60 (17.70%) responded negatively. Out of 339 security personnel that responded, 275 (81.12%) responded positively while 64 (18.88%) responded negatively.

At the control locations focus interaction majority of the respondent are farmers and confirmed that they do not have any pollution associated with crude oil exploration in their community.

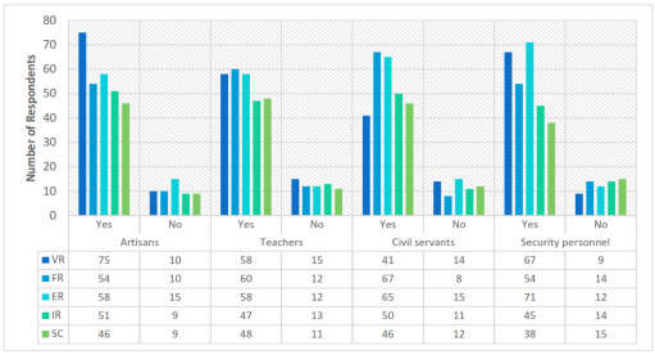

Figure 5: Professions of Respondents and their responses

Key: VR = Village Road, FR = Farm Road, ER = Ekpe Obo Road, IR = Intake Inyang Road, SC = Shell Camp.

Level of Respondents to Causes of Crude Oil Spillages Recorded in Study Locations

A total of 339 questionnaires were received out of 400 distributed to the affected crude oil bearing communities for pipeline rupture as the cause of cr ude oil spillage in the study area and as indicated in figure 6 , 69 (20.35%) respondents said yes while 270 (79.65%) of them said no. Consequently, the major cause of oil spillages in the study area may not have been pipeline rupture. Results in figure 11 also indicate that 271 (79.94%) out of 339 respondents identified pressure build up as a major factor for oil spillages in the area while 68 (20.06%) responded no. Thus, the main cause of oil spill in the study area could be pressure build up in corked we lls.

No oil spillages recorded at the control site as reported during the stakeholders meeting with opinion leaders and cross section of the community youth, women. All confirmed non-availability of crude oil wells. Also indicated that no crude oil exploration has ever recorded in the community.

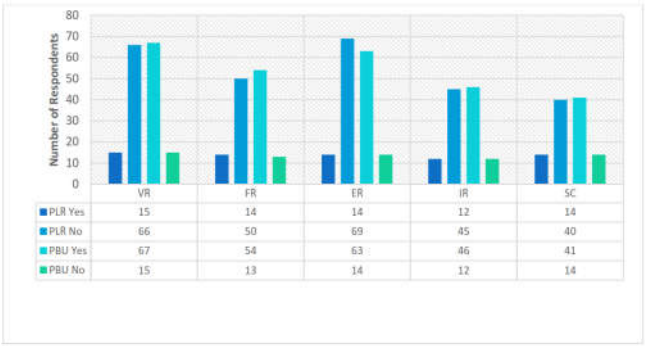

Figure 6: Statistics of respondents on the causes of crude oil spillages.

Key: VR = Village Road, FR = Farm Road, ER = Ekpe Obo Road, IR = Intake Inyang Road, SC = Shell Camp, PLR = Pipe line rupture; PLR = Pressure build up

Level of Respondents to e Environmental Effect of Crude Oil Spillages

Results for the outcome of questionnaires administered to assess the impact of crude oil spillage in the study are shown in figure 7. Results obtained revealed that, out of 339 questionnaires administered to evaluate impact of oil spillage on water bodies 270 (79.64%) respondents confirmed negative impact on water bodies while 69 (20.36%) said no. Consequently, oil spillage in the study area may have im pacted negatively on the water bodies. Results in figure 7 indicate that, out of 338 questionnaires administered to determine the impact of oil spillage on aquatic ecosystem 68 respondents (20.12%) responded positively while 270 people (79.88%) responded negatively. Thus, oil spillage in the study area may not have shown significant negative impact on destroying aquatic organisms. On the destruction of farmland by oil spillage, 339 questionnaires were administered out of which 68 (20.06%) responded positi vely while 271(79.94%) indicated negative response. Based on the outcome, major damage may not have been done on farmlands by oil spillage in the study area. Three hundred and forty (340) questionnaires were administered to identify the response of host co mmunity on cases of oil spillage. Out of this number, 272 (80%) responded affirmatively that cases of oil spillage has been reported to State Environmental Agency while 68 (20%) of the respondents said no. Hence, most of the oil spillages in the study are a may has been reported to the agency responsible by the host community.

At the control site stakeholders meeting opinion leaders confirmed that they have never recorded any environment effect associated with crude oil spillages. As such the distribution of questionnaire to ascertain the level of effect was not applicable since there is no crude oil production and exploration activities at the control location.

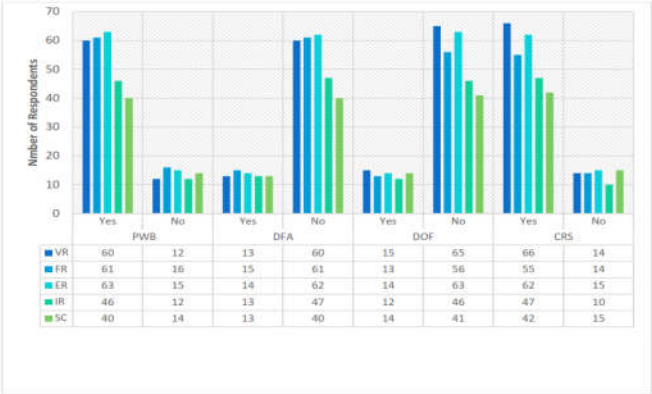

Figure 7: Statistical illustration of Effect of crude oil spillages in study area

Key: VR = Village Road, FR = Farm Road, ER = Ekpe Obo Road, IR = Intake Inyang Road, SC = Shell Camp, PWB = Pollution of water bodies; DFA = Destruction of aquatic organisms, DOF = Destruction of farmland, CRS = Community.

Major Ecological Problems of Crude Oil Effect in Study Locations

Results for the outcome of questionnaires administered to assess major ecological problems associated with crude oil extraction in the study area are displayed in figure 8. A total of 339 questionnaires were administered to examine the extent of pollution and destruction of existing facilities and deforestation by crude oil extraction, out of which 270 (79.65 %) was positive while 69 (20.35%) was negative. Accordingly, activities associated with crude oil extraction in the study area may have destroyed significantly facilities and trees in the forest within the host community. Out of 338 respondents on land/soi l degradation by oil extraction activities in the study area, 271 (80.18%) responded positively while 67 (19.82%)

responded negatively. Consequently, oil extraction activities within the study area may have impacted negatively and significantly on the soil environment. On the causes of marine/coastal erosion by oil extraction activities, 339 questionnaires were administered out of which 270 (79.65%) responded positively while 69 (19.82%) responded negatively. Thus, oil extraction activities may have resulted d in marine and coastal erosion in the study area.

No ecological problem associated with crude oil exploration activities at the control site. This assertion was confirmed by the community leaders and other opinion leaders during the stakeholder meeting held with the community on consultation on March-16 prior to the distributions of the questionnaire.

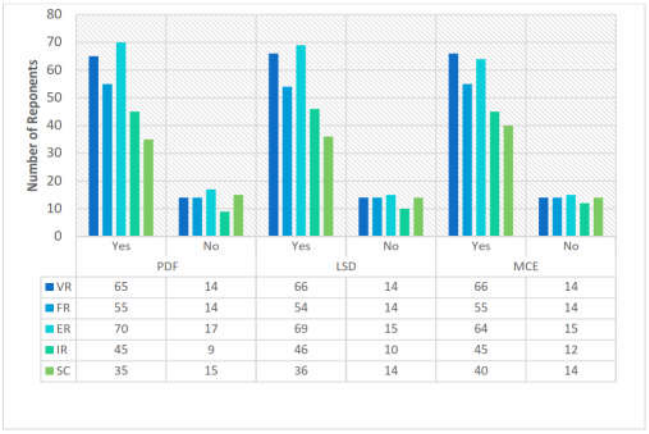

Figure 8: Statistical illustration for Major Ecological Problems of crude oil spillages

Key: VR = Village Road, FR = Farm Road, ER = Ekpe Obo Road, IR = Intake Inyang Road, SC = Shell Camp, PDF = Pollution and destruction of facilities; LSD = Land/soil degradation, MCE = Marine/coastal erosion.

Level of Respondents to Functions of Oil Company the Study locations

Questionnaires were administered to examine how Oil Company operating within the study area is managing wastes generated; and how the company is relating with people within the host community and the outcome is shown in figure 9. Results in figure 9 indicate that out of 339 respondents on the provision of refuse dumpsite by Oil Company, 69 (20.35%) said yes while 270 (79.65%) responded negatively. Hence, Oil Company operating within the study area may not have provided refuse dumpsite for wastes generated by the company. This trend should be controlled to avoid the environmental and health consequences associated with oil related wastes. Three hundred and thirty nine (339) questionnaires were administered on the payment of compensation to the community by Oil Company out of which 12 (3.54%) responded positively while 327 (96.46%) responded negatively. Thus, most pe ople within the host community may not have benefitted from the compensation by the Oil Company. On the improvement of lives within the host community by Oil company, 339 respondents were obtained out of which none was positive while the 339 (100%) respond ed negatively. Hence, the presence of Oil Company in the study area may not have improved upon or provided new facilities within the host community.

No impact recorded from crude oil related activities at the control location. This assertion was made by the stakeholder during consultation meeting held with the opinion leaders of the community on March-16 at the venue of the village head of the community.

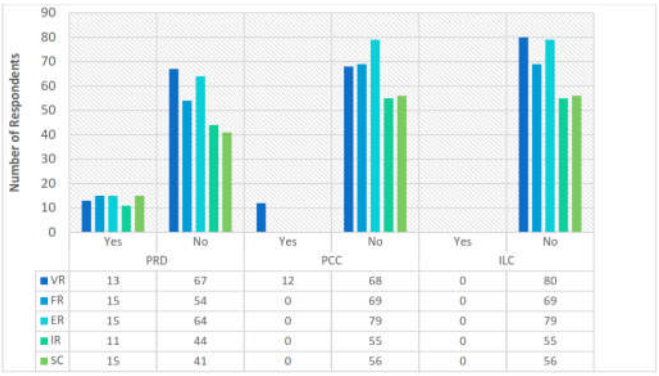

Figure 9: Statistical illustration for functions of Oil Company on the disposal of wastes

Key: VR = Village Road, FR = Farm Road, ER = Ekpe Obo Road, IR = Intake Inyang Road, SC = Shell Camp, PRD = Provision of refuse dumpsite; PCC = Payment of compensation, ILC = Improving the lives of host communities.

Level of Respondents to h Health Effect Caused by Crude Oil in Study Locations

Figure 10 illustrate es the health problems associated with oil activities within the study area. Results obtained from questionnaire administered revealed that, at all the studied locations respondents did not experience any health problem associated with oil activities in these locations. A total of 339 questionnaires were administered and all the respondents responded negatively to oil related health problems. Thus, at all the locations the percentage of those that said no on health issues was 100% as there was no respond ent with positive response. Consequently, the activities of Oil Company operating within the study area (Anakpa Uruan) may not have contributed to any health challenge within the host community as at when this research was conduct.

No health effect associated with crude oil pollution at the control site in view of the stakeholder meeting held with the opinion leaders of the community on the March-16 prior to the commencements of the socio-economic effect of crude oil exploration at the control site.

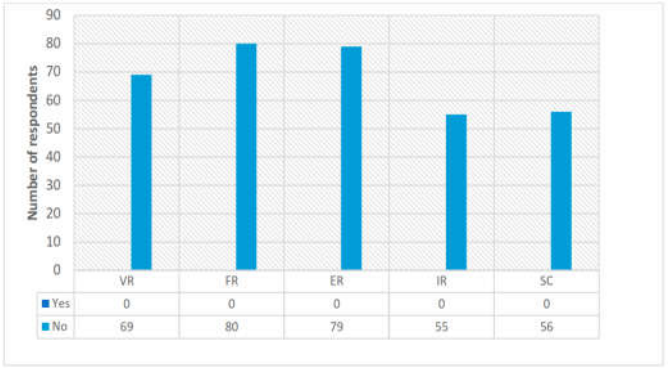

Figure 10: Statistics of Health problems associated with crude oil extraction

Key: VR = Village Road, FR = Farm Road, ER = Ekpe Obo Road, IR = Intake Inyang Road, SC = Shell Camp, PLR = Pipe line rupture; PLR = Pressure build up.

CONCLUSION

The study provided information on effect of crude oil exploration and exploitation in Anakpa Uruan Industrial communities. The result showed that the exploration activities negatively impacted the crude oil bearing communities. The ecological environmental consequences reported had contributed to decline in soil fertility and agricultural output. The unique biodiversity of the area had also been impacted by crude oil exploration activities leading to loss of medicinal plants and other vegetables used by the people within the studied areas. The study also shows that the accidental crude oil spillages occasional recorded in the area had been attributed to decayed mechanical structure at the well -head. The study showed that the area had suffered long years of neglect by the oil prospecting companies as there is no compensation paid to the people in view of the environmental consequences suffered on the agricultural land due to crude oil spillage. Though there was no health risk recorded but there is urgent need for the oil company to provide basic infrastructural facilities to the affected communities. Compensation should also be paid so as a measure to reduce the extent of damages done on land used by this people for agricultural purposes. There is also need for the oil prospecting companies to develop sound and sustainable environmental policies and guidelines to reduce the effect of pollution on the environment.

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