PERCEIVED IMPACT OF OIL BUNKERING ON THE ENVIRONMENT OF IKWERRE COMMUNITIES IN RIVERS STATE, NIGERIA.

BY

Asim, Okang Eta
oestyasim@gmail.com

&

Onwineng, Victor Edet
onwinengvictor@gmail.com
Department of Environmental Education
University of calabar

Abstract
This study looked at the perceived impact of oil bunkering on the riverine communities as it affects the water bodies and land. Two research questions guided the study. Survey research design was adopted with questionnaire as the instrument for data collection. 384 adults were drawn from a population of 271,700 as sample size of the study using Krejcie and Morgan table. Accidental sampling technique was used to collect Data and was analyzed using simple percentages. The findings of the study show that; oil bunkering activities have severe negative impact on water and land of Ikwerre communities and has led to environmental degradation. The study concluded that the neglect of environmental cleanup of oil on water and land would result to barren water and land. The researcher recommended that environmental education awareness for residents in Ikwerre communities should be intensified. River state government should carry out continuous public enlightenment campaigns in the communities, local town crier, age grade meetings, on the implications of pipeline vandalism and illegal refining of crude oil on the environment. Youths should be empowered through vocational training and skill acquisition to avoid over dependency on oil as the only source of income.
Keywords: Oil bunkering. Riverine communities, Ikwerre tribe, Environmental degradation, and Environmental health issues.

Introduction

Oil bunkering in Nigeria and in the Niger Delta region and Rivers States is not a recent development. However, oil bunkering has assumed a new dimension with the advent of illegal refineries. The oil bunkering sites are hidden in the forest, creeks or riverside where the stolen crude oil is transformed into various petroleum products. The term oil bunkering refers to all acts involving oil theft, which usually includes the smuggling and diversion of crude oil (Bodo, Gimah and Seomoni, 2020). Normally, a small group of welders are recruited to puncture the pipelines at night, preparing the way for others to steal crude oil which is later transported

elsewhere to be refined and sold abroad or locally The operationsof oil bunkering usually start from the taking of oil from pipelines or flow stations and also in some instances an extra crude oil can addedto legitimate cargo that is not accounted for (Ugwuanyi, 2013).

The activities of oil bunkering have brought about severe environmental degradation to the host communities and the world at large. The earth is currently and constantly facing a lot of environmental degradation leading to environmental health issues. These issues like pollution of air, water, land, deforestation, loss of biodiversity, climate crises and many more have tremendous effects on human, animal and the environment. Environmental health issues refer to problems related to the environment and their impact on the well-being and safety of humans. Over the past decades, t88he exploitation and degradation of our environment has increased at an alarming rate as human actions have not been in favour of protecting the environment. Human actions like agricultural activities, bunkering operation etc tend to produce hazardous substances which are left in the natural environment of air, water and land, and in turn impact the health of the environment and subsequently that of the humans within that environment and the development of the economy.

Several years after the crises of oil bunkering began in Port Harcourt, Rivers State; the health damaging effect of oil bunkering persists in the city. The black soot that plagues the city of Port Harcourt has been linked to artisanal refining of stolen crude oil (Logomenu, 2022). The impact of the oil bunkering and vandalisation of pipelines since 2016 have caused spills that contaminate rivers and streams that serve as a major source of water for domestic use, increased presence of black soot, resulting in poor air quality and dark rain, destruction of agricultural land, destruction of aquatic life, flora, and fauna. The government expressed concern about the situation and linked the soothe to the activities of illegal refineries, oil bunkering and burning of tyres (Orji, 2021).

In 2018, the Federal Ministry of Environment linked the problem of soot enveloping Port Harcourt city to the operation of oil bunkering or kpo-fire (street language for illegal oil bunkering business) and their destruction. “There is a direct correlation between the level, intensity and composition of the soot and illegal oil refinery activities, including their destruction of the environment of the host communities,” the ministry concluded. The destruction of illegal refineries has since resumed with its dire environmental and health consequences. Also, the National Oil Spill Detection and Response Agency (NOSDRA) confirmed that the black soot originates from close to a hundred abattoirs in the city that burn tyres to process meat, and the burning of stolen petroleum products by bunkers which has recently led to the environmental health issues plaguing the riverine communities in the city (Logomenu, 2022).

The effect of oil bunkering is worse on the riverine communities because the bunkered oil is mostly transported through the waterway. Ikwerre LGA of Rivers State is mostly riverine, and

the residents are predominately farmers, fisher folks, hunters and traders, whose means of livelihood may be affected by the changes in the environment. It is against this backdrop that the researcher wants to find out the perceived impact of oil bunkering on riverine communities in Ikwerre tribe.

The study was undertaken generally to investigate the perceived impact of oil bunkering on riverine communities in Ikwerre tribe. This study would specifically find out if;

1. Perceived impact of oil bunkering on land in Ikwerre tribe
2. Perceived impact of oil bunkering on water in Ikwerre tribe

Research questions

1. What impact does oil bunkering have on land in Ikwere community?
2. What are the perceived impact of oil bunkering on water in Ikwere community?

The land and the people of Ikwerre tribe

The Ikwerre (natively known as Iwhuruoha, meaning the face of the community) are one of the Igbos subgroup in Rivers State located in the South South geopolitical zone of Nigeria and was created in the year 1991. Ikwerre land lies roughly within the coordinates of latitude 5^0 1' 23" N and longitude 6^0 52' 50" E. The Ikwerre tribe inhabits the riverine and upland communities in Rivers state. The estimated population of Ikwerre tribe is put at 2,000,500 (City Population Statistics, 2022). Ikwerre tribe sits on a total area of 1,380km^2 and has an average temperature of 26^0C. The average humidity level is 90 percent with the area witnessing two distinct seasons which are the dry and the rainy seasons.

The rainy season in Ikwerre LGA lasts longer than the dry season and is usually characterized by heavy showers. The Ikwerre tribe owns more than 20 percent of the arable land in Rivers State and has a viable agricultural sector with a rich soil that is adequate for the cultivation of raffia, palm produce, yam, cassava, plantain, banana and vegetables grown in the area. The riverine Ikwerre villagers engage in fishing as well as farming, trading, wood work and hunting.

The Ikwerre tribe speaks the Ikwerre dialect which is slightly different from Igbo language. Christianity is the most practiced religion in the area. A number of popular festivals are held in Ikwerre tribe and these include the New Yam and the Ikwerre wrestling festivals. Traditional history has classified Ikwerre into seven (7) groups called Ikwerre Essa. The groups are Elele, Isiokpo, Umuji, Emohua, Choba, Aluu, Igwuruta and Obio/Akpor. Ikwerre tribe occupies four (4) out of the twenty three (23) LGA of Rivers State namely Ikwerrre LGA, Emuoha LGA, Obio/Akpor LGA and Port Harcourt city LGA (Kumasi, 2017).



Source: Kumasi, 2017 (The four LGAs in Ikwerre tribe)

Ikwerre tribe is also rich in mineral deposits which include crude oil and natural gas. It has a total of 92 oil wells, producing an estimated 100,000 barrels of crude oil daily. The Ikwerre tribe, in addition to other industries and establishments, therefore, play host to several multinational oil-producing and servicing companies. Despite these, the Ikwerre, like nearly all other minorities of the Niger Delta frequently complain of marginalization by the oil operatives (www.nigerdeltabudget.org). The Ikwerre communities are faced with the problem of marginalization, extreme poverty and environmental degradation of its lands and rivers; this is done through the exploitation of the oil and gas resources. Emuoha LGA in Ikwerre tribe is the most vulnerable in terms of the activities of oil bunkering; the communities where oil bunkering is done are Ibaa, Elele, Alimini, Apabuo and Obele Ibaa.

Conceptual framework

A few concepts would be defined as used in the work. These terms are;

Oil bunkering

Oil bunkering or illegal cottage refineries or crude oil theft (also known as kpofire in the local parlance) involves breaking of pipelines and siphoning of crude oil products. This act invariably leads to oil spillage and oil spillage causes environmental degradation.

Oil bunkering involves diversion and smuggling crude oil from pipelines and storage facilities. It is usually done by local bandits, who often use chainsaws and sharp blades to cut into pipes

transporting crude oil, causing pollution, and sometimes, even accidents. Oftentimes, they blow up pipelines and gather the crude. "The stolen crude is put in drums and burnt far away in the bush over a long period of time. After the burning process, it is sieved," explains Mohammed Bashir, an oil and gas expert, as he describes the process of bunkering. "This process of refining the oil is not going to give the best of diesel or AGO (automated gas oil), but it is usable. This is what the bandits put in drums or jerry cans and sell illegally," he says (Report of channelstv, 2022).



Source: Igonikon (2022) for BBC News Pidgin, Port Harcourt

Riverine communities

Riverine communities are great assets to any nation. They present great values for fishing, agriculture, processing industries, commerce, transportation and many more. Riverine communities are those communities whose towns and villages are substantially situated or surrounded by rivers and their main occupation is fishing in addition to the general occupations of farming and trading. Rivers State has an indigenously diverse population with major riverine and upland communities. The riverine communities are situated in part of Kalabari, Ahoada West, Degema, Khana, Ndoki, Egbema, Opobo, Gokana, Ogoni, Okirika, Ikwerre tribe etc. The riverine communities are often prone to environmental degradation resulting from oil bunkering and oil spills because the bunkered oil is mostly transported through the waterways causing severe damage to the water bodies and aquatic lives (www.manpower.com.ng).

A review of oil bunkering in riverine communities

The first commercial discovery of crude oil wealth was at Oloibiri in Bayelsa State in 1956. Bayelsa is a riverine community in the Niger Delta region of Nigeria. Every day, oil companies in Nigeria lose between 300,000 barrels of oil to illegal theft. Oil theft accounts for roughly 15 percent of Nigeria's 2.4million barrels per day produced (Bodo, Gimah and Seomoni 2020).

Oil theft or bunkering occurs throughout riverine communities in the Niger Delta region, where pipelines crisscross the region. The vast majority of this is sold internationally, but approximately 25% stays in the Niger Delta for refining and consumption. Illegal oil refining in the region comes with steep environmental, economic andsocial costs. Artisanal refining begins with the procurement of stolen crude oil and subsequently refining them in the illegal or "bush'' refineries, with the use of local resources and skills.

Oil bunkering has made oil spillages and explosions a commonoccurrence in the Niger Delta region (Campbell, 2015). In Ikwerre tribe of Rivers State vandalism of pipeline and thefts of oil are serious problems in the state. Some people within the riverine communities damage pipes while trying to steal small quantities of oil for sale at local markets or for personal use.

Despite efforts by Nigerian government (state and local level) to curtail bunkering by increasing security, oil theft and pipeline vandalism is still very high in riverine communities in Ikwerre causing a lot of impact on the environment.

Impact of oil bunkering activities

Illegal oil bunkering and artisanal refining are on the risein various riverine communities, worsening the environmental challenges and ecological destruction of land and surface water bodies in the region, as well as the health implications associated with it. Artisanal refining begins with the procurement of stolen crude oil and subsequently refining them in the illegal or "bush" refineries, with the use of local resources and skills. As a riverine community, Ikwerre tribe of Rivers State has had its own fair share of the impact.

The impact of oil bunkering on riverine communities like Ikwerre will be discussed in two perspectives; that is impact on the environment (water, land and air) and impact on their health status.

Impact of oil bunkering on water bodies and aquatic lives

The quality of the water in an aquatic environment is important for the survival of the flora and fauna and the overall health of the aquatic environment. The activities of oil bunkering generate dark sludge (waste oil) which is discharged into the water bodies, covering large areas and creating a wilderness effect on the streams or rivers. Local crude oil bunkering activities, including the waste generated is disposed of into swamps, creeks and the surrounding vegetation and this in turn affects the groundwater system as well as the aquatic ecosystem (Amangabara and Njoku, 2018).

Crude oil spill from illegal bunkering pollutes streams and rivers and can have a devastating effect on the water environment by spreading over the surface in a thin layer which stops oxygen getting to the plants and animals that live in the water. It harms aquatic animals such as fishes, periwinkles, crabs and crayfish; prevents photosynthesis in plants, disrupts the food

chain and the water bodies take a long time to recover or remediate. Moreso, fishing which is the traditional occupation of the Ikwerre people and their major source of income is being eroded as a result of crude oil spills (Oteiva and Boisa, 2018).

The presence of this oil in the water delays the growth of new fingerlings, most often the fingerlings die.



The presence of oil in the water can damage their fishing net and other equipment, makes the water unsafe for drinking, prevents swimming and other recreational activities. Oil Contamination affects the aquatic ecosystem and by extension affects the fisher folks that rely on fishing to support their family.



Source: Impact of oil bunkering on aquatic life (Tyger and Akujuru, 2021)

Impact of oil bunkering on land and vegetation

The Ikwerre environment is a highly sensitive ecological zone known for high biodiversity and the rural people of the oil rich communities depend on these resources for their livelihood.

The Ikwerre vegetation consists mainly of rainforests, brackish swamp forests and mangrove forests. During oil bunkering, the waste oil from these bunkering sites are released into the forest vegetation (forest ecosystem), thereby causing the destruction of medicinal plants used by residents'of the riverine communities, these medical plants are used by traditional health care homes for delivery and treatment.

As the plants die and decay, the soil stabilization properties of the roots are lost, leading to coastal erosion and low productivity in plants as the crude oil blocks stomatal pores thereby preventing photosynthesis. The pollution of the soil by hydrocarbon components from crude oil bunkering, such as polycyclic aromatic hydrocarbon (PAH) has resulted in reduced agricultural productivity through the loss of soil quality, leaching and erosion (Kadafa, 2012).

The loss of vegetation drastically hampers the regeneration of species in the forest as seeds and saplings in the forest floor are contaminated. One major effect of the discharge of illegaloil waste is the loss of vegetation (forest and mangrove ecosystem) which provides food and shelter for fauna species, leading to the destruction of wildlife habitat. The impact is also seen in the alteration of local water cycle as trees play important roles in water cycling function, the disruption of air purification resulting from reduced carbon sequestration provided by trees and the long term effect is the aggravation of climate crises (Umechuruba, 2005).

During the activities of oil bunkering, large expanses of forest trees are cut down leading to deforestation and loss of arable farm lands. Forest fire is very common in Ikwerre, often times this results from the fire used in burning the crude oil and this has led to the destruction of large forest vegetation as well as root crops like yam, cassava and cocoyam, cash crops such as oil palm, coconut, raffia palm etc other crops grown for food such as vegetables, melon, pineapples, plantain and bananas, among others, which could have been harvested and sold for income. The presence of the waste oil on the farm land has led to the loss of crop yield and this has a major effect on food security in the community (Oyinkepreye, Kayvan and Norman 2020).



Farmland contaminated by crude oil from a local cottage refinery in Ikwerre
Source: Ibunge (2022) for thisdaylive.com

Impact of oil bunkering on air quality

There is growing outcry and understandable anxiety in Port Harcourt, the Rivers State capital, over the increasing presence of black soot, resulting in poor air quality. This black soot is linked to the activities of illegal oil refineries, gas flaring, burning of Asphalt and burning of tyres. This problem has become a serious public health issue and doctors in Port Harcourt have already confirmed an increase in the number of people with breathing difficulty, according to reports. The emergence of soot, one of the deadliest forms of air pollution, poses a different kind of hazard to residents of the state.

Since the last quarter of 2016, the black soot has become an environmental issue for residents of Port Harcourt. Scientists have determined that the soot particles are extremely small and stay in the air for months, stinging the eyes and causing irritation to the nose and throat. The soot particle, according to "Mr Nemo Bassey, Director of Health of Mother Earth Foundation added that the soot consists of carbon particules that results from inefficient burning of hydrocarbon". These particles can enter any closed space that air enters, including homes, classrooms, worship places and offices. The soot is inhaled effortlessly by people who do not wear masks and has serious health implications on the humans, animals and the environment (Ewodage, 2022 for channelstv).



Source: Logomenu (2022) for thisdaylive)

The presence of soot in Rivers State also affects neighboring state like Akwa Ibom, Bayelsa, and Delta State etc. The illegal refineries are critical contributors to these problems. Communities where there are no illegal refineries or oil bunkering also suffer from the impact because the atmosphere and movement of the soot particle has no boundary across states.

Impact of oil bunkering on health status

Oil bunkering operations especially gas flaring and oil spillage which contaminates the air, land and water are known to have deleterious effects on human health. Most of the riverine communities in Ikwerre tribe do not have access to portable water but depend on water from ground water, streams, and rain water for sustenance. The hydrocarbons released during oil bunkering into the environment and gases such as CO (Carbon monoxide) and CO_2 (Carbon dioxide) have negative effect on human health. Skin contact with certain chromium compounds can cause skin ulcers and ingesting large amounts of it can cause stomach upset and ulcers, kidney and liver damage and even death.

According to Egbe and Thompson (2010) the environment is polluted by oil spill during bunkering activities and the multiplier effect can cause health problems like respiratory problems, increased blood pressures, heart palpitation, stomach irritation, liver, lungs diseases and cancer, kidney and heart damage. Others include water borne diseases like cholera, diarrhea and dysentery caused by drinking polluted water, asthma and eye infections from the presence of soots in the air, skin infection, headaches, dizziness, nausea, vomiting, throat irritations, as well as breathing difficulties.

Efforts of the government (Federal, State and Local level) adopted to curb oil bunkering in the riverine communities

The successive Nigerian governments have undertaken some policy measures in response to tackle the menace of oil theft over the years. The Government has sought to address the escalating oil theft through the establishment of task force to monitor and respond to oil theft, establishment of a special security outfit (like the military), increased enforcement measures against the maritime trade in stolen oil which involved the Nigerian Navy being saddled with the responsibility of registration of vessels in Nigeria waters , closing market for illegal oil, a hotline for reporting oil theft, and also granting amnesty to Niger Delta Militants (Boris, 2015).

The Rivers State Governor Mr Nyesom Wike has on several occasions stormed the Ogbodo community in Ikwerre and Ibaa community in Emohua LGA where he uncovered and demolished some crude oil illegal refining sites responsible for the soot pandemic in the state. The purpose of confronting this havoc was to ensure that the health of Rivers residents' is not furthered hampered by those illegal refining activities (Ibunge, 2022 for thisdaylive). The State governor and the Chairman of Ikwerre council Samuel Nwansoike have also discovered at least 112 illegal refineries in Ikwerre, this discovery was made by the effort of the state government to bring an end to the economic sabotage brought about as a result of oil bunkering, the Governor Nyesom Wike had pledged N460 million to the 23 Local Government Area chairmen to fight oil bunkering in the state (Ewodage, 2022 for channelstv).

Despite efforts of the Federal, State and Local government at curbing the problem of oil bunkering, the end of oil bunkering seems not to be in sight, as oil bunkering activities is still

a very lucrative business in riverine communities due to high level of corruption, high level of youth unemployment, low level of awareness about environmental problems, poor governance, ineffective and corrupt law enforcement agencies and international crime collaborations etc.

Methodology

A survey research design was adopted for this study. The sample of the study comprise of 384 adults drawn from a population of 271700 using the Krejcie and Morgan table for sample size determination. A well-structured questionnaire made up of 15 items four points' likert type scale designed by the researcher was face validated by two experts in measurement and evaluation. Using Cronbach coefficient alpha reliability method, the instrument was found to be 0.72, confirming the reliability of the instrument. The instrument was administered to the respondents in the affected communities by the researcher. The data collected were analyzed using frequencies and simple percentages.

Result

Research question 1: what impact does oil bunkering have on land in Ikwere community?

Table 1 revealed that 10(5.2%) respondents strongly affirmed that the activities of oil bunkering has affected their community land, 6(3.2%) agreed, 17(8.8%) disagreed while 160(82.9%) strongly disagreed with the statement. Considering whether the activities of oil bunkering have affected the level of harvest from their farms, 12(6.2%) respondents strongly agreed to the statement, 26(13.5%) agreed, 141(73.1%) disagreed and 14(7.3%) strongly disagreed respectively. On verifying whether the activities of oil bunkering delay the maturity of their crops, 17(8.9%)of the respondents strongly affirmed to the statement, 23(11.9%) agreed, 41(21.2%) disagreed while 112(58.0%) strongly disagreed. 25(13.0%) respondents strongly agreed that activities of oil bunkering have rendered our farmlands useless, 100(51.8%) agreed, 42(21.8%) disagreed while 26(13.5%) strongly disagreed. 20(10.4%) of the respondents strongly agreed that they are losing their farm lands through the cutting of forest trees in preparation of the activities of oil bunkering, 84(43.5%) agreed, 64(33.2%) disagreed while 25(13.0%) strongly disagreed. 94(48.7%) respondents strongly confirmed that the activities of oil bunkering on their lands have led to the disappearance of many plants they use to see in their forest, 42(21.8%) agreed, 28(14.6%) disagreed and 29(15.0%) strongly disagreed respectively. Finally, 129(66.8%) of the respondents strongly agreed that Oil bunkering has destroyed many of our plants that we use as medicine, 21(10.9%) agreed, 18(9.4%) disagreed while 25(13.0%) strongly disagreed. Summary of the responses in this section is given in figure 1 where the scores for strongly agree and agree are collapsed into agree while those of strongly disagree and disagree were collapsed into disagree

Table 1: Perceived impact of oil bunkering on land (n = 384)

Statements	Strongly disagreed	Disagreed	Agreed	Strongly Agreed
1. The activities of oil bunkering has affected my community land	10 (5.2%)	6 (3.2%)	17 (8.8%)	160 (82.9%)
2. The activities of oil bunkering have affected the level of harvest from our farms.	12 (6.2%)	26 (13.5%)	141 (73.1%)	14 (7.3%)
3. The activities of oil bunkering delay the maturity of our crops.	17 (8.9%)	23 (11.9%)	41 (21.2%)	112 (58.0%)
4. Activities of oil bunkering have rendered our farmlands useless.	25 (13.0%)	26 (51.8%)	42 (21.8%)	100 (13.5%)
5. We are losing our farmlands through the cutting of forest trees in preparation of the activities of oil bunkering.	20 (10.4%)	25 (48.5%)	64 (33.2%)	84 (13.0%)
6. The activities of oil bunkering on our lands have led to the disappearance of many plants we use to see in our forest.	29 (48.7%)	42 (21.8%)	28 (14.6%)	94 (15.0%)
7. Oil bunkering has destroyed many of our plants that we use as medicine.	25 (66.8%)	21 (10.9%)	18 (9.4%)	129 (13.0%)

Research question 2: What are the perceived impact of oil bunkering on water in Ikwere community?

Table 2 shows. Only 62 (32.1%) strongly agreed that they can no longer drink water from the streams and rivers because of the oil in the water, 42 (21.8%) agreed, 17(8.8%) disagreed while 72(37.3%) strongly disagreed to this statement. On whether they can no longer see some of the fishes they use to see in their rivers and streams before the oil bunkering, 127(65.8%) of the respondents strongly agreed to this statement, 6 (3.1%) agreed, 5(2.6%) disagreed and 55 (28.5%) strongly disagreed. Regarding whether they can no longer use water from their streams and rivers to wash their clothes because of the oil in the water, 126(65.3%) of the respondents strongly agreed to this statement, 2(1.0%) agreed, 5(2.6%) disagreed and only 60(31.1%) strongly disagreed. 24(12.4%) respondents strongly agreed that the activities of oil bunkering have reduced the quantity of crabs they harvest from their rivers, 15 (7.7%) agreed, 54(28.0%) disagreed and 100(51.8%) strongly disagreed. 63(32.6%) respondents strongly agreed that their water from the streams and rivers are no longer safe for drinking, 47(24.4%) agreed, 29(15.0%) disagreed and 54(28.0%) strongly disagreed. On whether they can no longer swim in their

rivers and streams because of plenty oil in the water, 80 (41.5%) respondents strongly agreed, 46(23.8%) agreed, 24(12.4%) disagreed and 43(22.3%) strongly disagreed. Pertaining to whether they can no longer bath with the water from their streams and rivers because of the oi,104(53.9%) of the respondents strongly agreed, 7(3.6%) agreed, 26(13.5%) disagreed and 56(29.0%) strongly disagreed respectively. 125 (64.8%) respondents strongly agreed that the activities of oil bunkering have reduced the quantity of fish their can catch, 2(1.0%) agreed, 14(7.3%) disagreed and 52(26.9%) strongly disagreed. On whether there is so much oil in water as a result of the activities of oil bunkering, 107(55.5%) participants strongly agreed to this statement, 17(8.8%) agreed, 19(9.8%) disagreed and 50(25.9%) strongly disagreed.

Table 2: Perceived impact of oil bunkering on water (n = 384)

Statements	SA	A	D	SD
1. I can no longer drink water from the streams and rivers because of the oil in the water.	123 (32.0%)	84 (21.9%)	31 (8.1%)	146 (38.0%)
2. We can no longer see some of the fishes we use to see in our rivers and streams before the oil bunkering.	253 (65.9%)	12 (3.1%)	8 (2.1%)	111 (28.9%)
3. We can no longer use water from our streams and rivers to wash our clothes because of the oil in the water.	249 (64.8%)	8 (2.1%)	8 (2.1%)	119 (31.0%)
4. The activities of oil bunkering have reduced the quantity of crabs we harvest from our rivers.	49 (12.8%)	29 (7.5%)	107 (27.9%)	199 (51.8%)
5. Our water from the streams and rivers are no longer safe for drinking	126 (32.8%)	96 (25.0%)	55 (14.3%)	107 (27.9%)
6. We can no longer swim in our rivers and streams because of plenty oil in the water.	161 (41.9%)	92 (23.9%)	47 (12.3%)	84 (21.9%)
7. We can no longer bath with the water from our streams and rivers because of the oil.	207 (53.9%)	12 (3.1%)	54 (14.1%)	111 (28.9%)
8. The activities of oil bunkering have reduced the quantity of fish we can catch.	245 (63.8%)	8 (2.1%)	27 (7.0%)	104 (27.1%)
9. There is so much oil in water as a result of the activities of oil bunkering.	211 (54.9%)	36 (9.4%)	38 (9.9%)	99 (25.8%)

Conclusion

This study outlined that the activities of oil bunkering have led to high level environmental degradation in terms of pollution of the air, water, land and the health of the residents in the riverine communities in ikwerre. Despite the efforts of the Federal, State and Local Government, the activities of oil bunkering still persist as the end of oil bunkering seems not to be in sight.

Recommendation

In order to halt the continuous environmental degradation of Ikwerre riverine communities resulting from oil bunkering, the following measures should be put in place:

1. Environmental education awareness for residents in the riverine communities should be intensified.
2. The government of Nigeria should carry out continuous public enlightenment campaign in the riverine communities (through the National Orientation Agency (NOA), local town crier, age grade meetings,) on the implications of pipeline vandalism and illegal refining of crude oil on the environment.
3. Youths should be empowerment through vocational training and skill acquisition to avoid over dependency on oil as the only source of income.
4. Free education for all the youths and children in the riverine communities.
5. Environmental Protection Agency (EPA) should be properly funded and empowered in order to carry out their constitutional duty of protection and enforcement of environmental laws.
6. Government must put in place measures for the remediation of degraded lands in affected communities.
7. Encourage residents' participation in afforestation and reforestation of degraded lands.
8. Government must ensure proper synergy between the Environmental Protection Agency (EPA), the Police, Civil Defence and Military in the enforcement of environmental protection laws.

References

Amangabara, G. T. & Njoku, J.D., (2018). Assessing groundwater vulnerability to the Activities of Artisanal Refining in Bolo and Environs, Ogu/Bolo Local Government Area of Rivers State; Nigeria. Br. *J. Environ. Clim. Change* 2 (1), 28

Bodo, T., Gimah, B. G & Seomoni, J. K. (2020). Illegal oil bunkering in the Niger Delta of Nigeria: A challenge to Nigeria's' development. *European Scientific Journal,* 16 (29):134-154.

Boris, O.H (2015). The Upsurge of Oil Theft and Illegal Bunkering inthe Niger Delta Region of Nigeria: Is There a Way Out? *Mediterranean Journal of Social Sciences,* 6 (3): 563-573.

Campell, J (2015). A Primer on Nigeria's Oil Bunkering. Council on Foreign Relations. https://www.cfr.org/blog/primer-nigerias-oil- bunkering .Retrieved 10th December, 2022).

City Population Statistics 2022. Retrieved from https://www.citypopulation.de/en/nigeria/admin on 20th December, 2022.

Egbe, R. E.& Thompson, D. (2010). Environmental challenges of oil spillage for families in oil producing communities of the Niger Delta region. *JHER*, 13, 24-34.

Ewodage, R. (2022). 112 Illegal refineries discovered in Rivers, Channels.tv.com on 23rd January, 2022. Retrieved from https://www.channelstv.com/2022/01/23/112-illegal-refineries-discovered-in-rivers/amp on 23rd December, 2022.

Ibunge, B. (2022). Wike clampdown on illegal refineries, thisdaylive.com on 14th ,January, 2022. Retrieved from https://wwwthisdaylive.com/index.php/2022/01/14/wike-clampdowns

Igonikon, K. (2022). One illegal bunkering site. BBC News, Port Harcourt on 2th February, 2022. Retrieved from www.bbc.com/pidigin/tori-60083814.amp.

Kadafa, A. A. (2012) Environmental Impacts of Oil Exploration and Exploitation in the Niger Delta of Nigeria. *Global Journal of Science Frontier Research Environment & Earth Sciences*. 12(3).

Kumasi, W. Y. C. (2017). Ikwerre: People with rich cultural, political heritage. Retrieved from www.nairaland.com/2269641/brief-history-ikwerre on the 20th December, 2022.

Logomenu,S.(2022).Menace of soot in Rivers State. Retrieved from https://www.google.com/amp/s/www.thisdaylive.com/index.php/2022/01/24/menace-of-soot-in-rivers/amp/ on 18th December, 2022.

Orji, S. (2021). Environment: Black soot still plagues the residents of the Niger Delta. Retrieved from https://citymonitor.ai/environment/black-soot-still-plagues-the-residents-of-the-niger-delta. on 20th December, 2022.

Oteiva , F., Boisa N. (2018). The effect of crude oil spill on the surface water of the lower Niger Delta (Sombriero River). Journal Ind Environ Chem. 2(2):19-24.

Oyinkepreye, L B., Simon, K., Kayvan, P, & Norman, R. (2020). Sustained impact of the activities of local crude oil refiners on their hostcommunities in Nigeria. *Journal of Holiyon*, 6 (3):1-9.

Report of ChannelsTv, 2022). Analysing the impact of illegal refineries on the environment on 27thJanuary,2022. Retrieved from https://www.Channelstv.com.

Tyger, E. & Akujuru, V. A (2021). The effects of oil spill in aquatic lives and property in kalabari in Rivers State of Nigeria. *American Journal of Humanities and Social Sciences Research (AJHSSR)*. 5(4), 119-135. Retrieved from www.ajhssr.com

Ugwuanyi, E. (2013). Oil theft: Endless search for solution, the Nation Newspaper of 26th March, 2013, pg 6.

Umechuruba, C. I (2005) Health impact assessment of mangrove vegetation in an oil spilled site at the Bodo West Field in Rivers State, Nigeria. *Journal of Applied Sciences and Environmental Management.* 9(1). www.manpower.com.ng. About Ikwerre Local Government Area (L.G.A). Retrieved on 17th of December 2022.

www.nigerideltabudget.org. Overview of Rivers State. Retrieved on the 17th of December, 2022.