

Effects of Environmental Degradation on Human Health in Selected Oil Communities in Delta State

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Abstract

The study investigated the effects of environmental degradation on human health in nine selected oil communities in Delta State using well-structured 450 copies of questionnaires. Specific oil spillage and gas flaring data within the selected communities were also used. Result showed that 95.2% of the people had experienced environmental degradation from the oil producing communities and some agreed that most of the effects are still ongoing. The overall major cause of environmental degradation in all the oil producing communities is the negligence of duty by government agencies charged with oversight duties of monitoring and compliance (30.8%), Neglect of Environmental regulations/compliance (26.8%), corruption (23.6%), Lack of Environmental Impact Assessment (EIA) reports from Companies either at the beginning of the project or periodic assessment (14.7%) respectively. This has however given rise to high degree of sabotage that causes oil spillage in the area. Each community agreed that they were vulnerable to environmental degradation. In Afiesere (33.3%) were vulnerable, 82.2% were vulnerable in Okpai, 77.8% in Kwale, 72.5% at Benekuku, 82.6% at Erhoike, 73.3% at Ekakprame, 97.7% at Ubeji, 95.2% at Uzere and 86.7% at Bomadi. In all, 77.5% of the residents in oil producing communities were vulnerable to environmental degradation while 22.5% were not during the period of study. The implication of this high vulnerability to environmental degradation by the people of these oil producing communities in Delta State shows that something must be done urgently to make living conditions better in these areas for them to be resilient to oil activities which will continue to increase in the area. The study also revealed that a total of 235 Diarrhoea cases were recorded, 187 Asthma cases, 511 cases of eye infection, 90 cases of Bronchitis and 157 cases of skin infection were reported at the hospitals in the area. This high figure could be linked to environmental degradation of air, water and land which is rampant in the area. The Federal Government through the Federal Ministry of Environmental Protection Agency (FEPA), Niger Delta Affairs Ministry, NOSDR and all Policy stakeholders in environment and oil and gas sector should revisit and review existing environmental and oil drilling laws in Nigeria with a view of updating them to international and environmental friendly standards.

Keywords: Environment, Degradation, Oil Communities, Human Health

1 INTRODUCTION

Environmental degradation is used to describe a situation in which a part of the natural environment is damaged. It can be used to refer to damage to the land, to water or the air. Environmental degradation can also mean a loss of biodiversity and a loss of natural resources in an area. Environmental degradation is a serious threat to the lives of people, animals and plants, making it imperative that we stop further degradation from occurring.

It is now no longer in doubt that there are absolutely no guarantees that extractive activities are safe. One accident could jeopardize an entire ecosystem (Gulf of Mexico oil spill, 2010). It has been common knowledge in many oil-bearing communities in Africa that the discovery of oil in a local community is akin to a declaration of full-fledged war on such a community. In the last few years, high energy demand has led to an upsurge in exploration and drilling of new oil wells both onshore and offshore in places where it would have been highly unprofitable to prospect for oil a few years ago. Nothing is sacred in this breathless search for new oil; pristine forests, sacred groves, ecologically fragile environments and even internationally recognized conservation sites are not left untouched in this quest for new oil finds.

Environmental problems associated with oil-related activities are numerous. From discovery to production to transportation and even consumption, oil related products are laden with danger signposts. For example, in shipping ports, where the trans-shipment of oil takes place, the chronic release of oil into the water through ship leakage, ship maintenance or mishandling is a continuing reoccurring dilemma. This problem is often ignored, despite the fact that its cumulative effects may have significant impacts on the surrounding ecosystem. Natural habitats, such as sea beds, mangroves, wetlands and mud lands, which are increasingly recognized as fundamental elements of a country's natural environment and economic resource base, are often located near or in maritime port locations (Chima, 2012).

According to Sajini (2011), one of the drivers of environmental degradation is rising energy use and human health and well-being is appreciably affected by the environment. Asthana and Asthana (2006) asserted that malnutrition and diseases caused by contaminated environment, human wastes, airborne diseases form the core of the diseases of the developing world. This means that contaminated environment due to human activities has resulted in several cases of ill-health, morbidity and shortening of lifespan (Sajini, 2011). It is pertinent that

the oil producing communities in Nigeria have had a fair share of these observed characteristics of degraded environment especially epitomised in the Niger Delta region of Nigeria.

Human health is strongly linked to the health of the ecosystem. However, destruction of natural resources such as soil, water and the atmosphere not only affect the terrestrial fauna and flora, but also results in unprecedented levels of disease emergence which potentially cause severe future impacts on human health (Haliza and Rapeah, 2010). Many important human diseases have originated in micro- and macro-organisms, thus, changes in the habitats of these populations may affect the mode of action as well as their pathogenicity. In addition, the continuous degradation of ecosystems is leading to increased susceptibility to disease caused by these organisms. The adverse health impacts will be much greater in low-income populations than in richer nations (Haliza and Rapeah, 2010). Thus, there is a great need for collective action to prevent environmental degradation.

It has being argued, that meaningful development would be difficult to achieve in the absence of a conducive environment which has been traditionally defined as the total surrounding which includes natural and biological resources. However, with the current trend of sustainable development, the definition of the environment has been widened to include natural and human resources and their interactions with each other.

Environment could be treated within the framework of natural human surrounding and activities, which include biophysical components and processes of natural environment of land, water and air. It also includes all layers in the atmosphere, inorganic and organic matters (both living and non-living), socio-economic components and processes of the human environment. These components and processes include social, economic, technological, administrative, cultural, historical, archaeological components and processes. Land and associated resources, structures, sites, human health, nutrition and safety are also inclusive (Emmanuel and Alakinde, 2006). McEachern (1997) identified keys to development to include level of labour productivity, technology and education, level of efficiency in the use of labour, presence of capital, infrastructure and availability and richness of natural resources among other things. These components of development target productivity which if not properly managed (especially the available natural resources) will lead to a degenerated environment, unfit for both man and the ecosystem at large. Therefore, sustainable development dwells on the capacity to improve the quality of human life while living within the carrying capacity of the supporting ecosystem. Development is real only if it makes our lives better in all ramifications; and sustainable development becomes a balancing act and sometimes compromise between efficiency (economic sustainability), equity (social sustainability) and conservation (environmental sustainability) (Olujimi, 2010).

Empirically, literatures exist that had studied the effects of crude oil and gas pollution on soils and crops in the Niger Delta and outside its borders (Bello, Aladesanwa, Akinlabi & Mohammed, 1999; Minai-Tehrani, Shahriari, and Savagbebi, 2007; Abii and Nwosu, 2009; Idodo-Umeh and Ogbeibu, 2010; Ojimba, 2011 among others). Bello, *et al*, (1999) for example examined the effects of gas flaring on the growth and yield of maize on farms located at some distances from gas flaring point. The experimental findings revealed that in the crop total leaf area monitored, mean percentage plant survival and grain yield were significantly reduced in all the locations compared with the controlled area and concluded that farms located 200m away from the flaring point failed to produce any yield. Minai-Tehrani, *et al*, (2007) observed the effects of different concentrations of light crude oil on the growth and germination of *festuca arundicea* (tall fescue) and the results showed that the germination number and dry biomass of the plant decreased by increasing light crude oil concentration in the soil. The light of the leaves reduced in higher crude oil concentration compared to the controlled.

Ikelgbe (1993) reveals that gas flaring sites around the western Niger Delta generates tremendous heat which is felt over an average radius of 0.5 km, thereby causing thermal pollution in the sub-region. Alakpodia (1990), carried out measurement around several flare sites, temperatures were as high as 40°C. Indeed the high temperatures around the gas flare sites are an indication that a distinct microclimate has been created by gas flaring.

Abii and Nwosu (2009) studied the effect of oil spillage on the soil of Eleme in Rivers State of Nigeria on two sides (Ogale and Agbonchia) while another area (Aleto) served as the controlled. The results indicated that oil spillage adversely affected the nutrient level and fertility status of the Eleme soil. Idodo-Umeh and Ogbeibu (2010) investigated the values of Total Petroleum Hydrocarbon (TPH) and heavy metals in soils, plantain fruits and cassava tubes harvested from farms impacted with petroleum and non-petroleum activities in Delta State, Nigeria. The results revealed that the values of heavy metals were higher in cassava tubers, epicap and mesocap of plantation fruits harvested from petroleum impacted soil than from non-petroleum impacted soils. Ojimba (2011) evaluated the social-economic variables associated with poverty in crude oil polluted crops farms in Rivers State. The study used a primary data (questionnaires) and employing tobit censored regression found that extent of income diversification reduced poverty drastically by 9.8 times in crude oil polluted farm-households and 12.7 times in non-polluted farm-households. Other variables identified in reducing poverty in crude oil polluted farms include land ownership by inheritance, years of farming experience, access to extension services and farm labour (Ojimba, 2011).

According to Ajibade and Awomuti (2009), the extinction of biodiversity, e.g. Flora and Fauna, destruction and contamination of soil, and the much obvious air/atmospheric pollution in the Niger delta has not only deteriorated the environment, but has also brought hopelessness to the inhabitants of the land. As a result of this, one ponder and ask, is the Nigeria nation exploiting Petroleum resources or exploiting the people of the area under the disguise of Petroleum exploitation, since no amount of money made from Petroleum exploitation can substitute for the life and comfort sniffed out of the people (Ajibade and Awomuti, 2009).

Researchers have shown that the pollution caused by oil spillage does not end with the mopping up of the spilled oil. It is now known that health risk is not averted by abstinence from fish killed by spilled oil. Some of the fishes and animals that escape instant death from pollution are known to have taken in some of the toxic substances, which in turn get into human beings that eat them. This will in turn cause infections on man coupled with other “side effects inform of genetic mutations” (Olusi, 1981). George, Akpabio and Udofia (2010) study shows that spills on soil samples reduce the density of sandstone interlaced with shale, Beach ridge sand and medium coarse sand by 17.7%, 13.3% and 15.0% on the average respectively. In the same vein, they opined that crude oil-rich beach ridge sand, sandstone interlaced with shale and medium coarse sand are respectively on the average decreased by 4.4%, 9.9% and 15.2% of the original value of the specific heat capacity of the unmixed samples, while the thermal conductivity of the crude oil beach ridge sand, medium coarse sand and sandstone and shale derivative have their values increased by 9.8%, 2.6% and 12.3% respectively on the average.

The thermal state of Niger Delta is influenced by natural phenomena such as weather, climate, radioactivity and greenhouse effect as well as the artificial phenomena such as oil spillage, deforestation and burning of materials which are either flammable or non-flammable (Akpabio, George, Akpan and Obot, 2010). Although the thermal gradient increases with depth, the exposed surface Benin Formation is predominantly made to depart from its natural thermal state through man’s activities which are either deliberate or in-deliberate. Apart from the uncontrollable means or the agricultural contributions to the departure of the thermal silicic soil built on the deposits of the high energy Niger Delta, oil spillage has among other things contributed greatly to the thermal destabilisation. The impacts of oil spillage and gas flare have been experienced in Nigeria in the recent years and its occurrence is at very fast and alarming rate in the oil producing communities (George, Akpabio and Udofia, 2010).

Soil or landform is greatly important in agriculture. Its temperature depends on the pore spaces and the material making up the formation (Black well and Steele, 1989). In all ramifications, soil temperature depends on the environmental temperature (George, Obioanwu, Akpabio and Obot, 2010), however, spillage of crude oil on the soil greatly affects the thermal properties of the soil samples. In his view, Egwu (2012) posited that Oil spill is one of the greatest environmental and health concerns in contemporary Nigerian Oil and Gas industry. The rate of spill incidents has escalated to a serious and unacceptable level of about 80% between 1976 and 2012 in oil producing areas of the Niger Delta region as shown in fig 1. below.

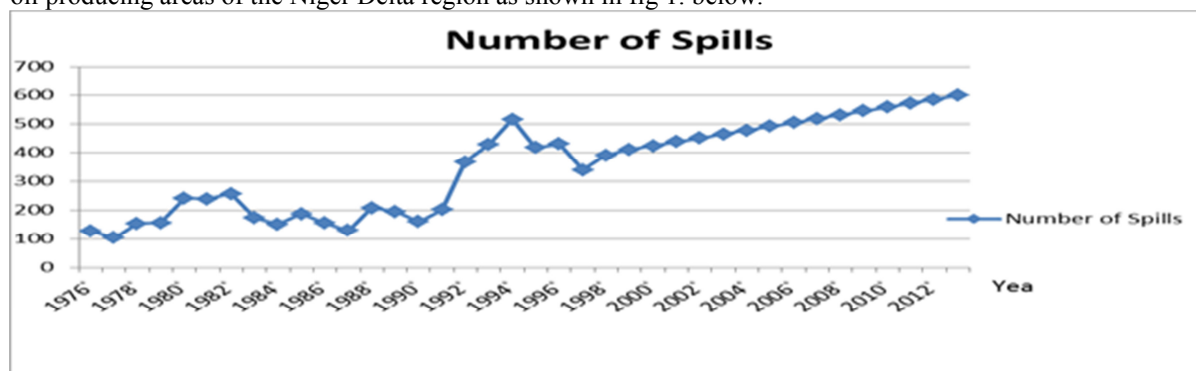


Fig 1: Number of Oil Spills in the Niger Delta region. **SOURCE:** Department of Petroleum Resources

The increase in intensity and volume of oil has created situations virtually unacceptable to major oil industry stakeholders and the public as environmental degradation has become worse in the oil producing areas. The observed level of pollution and concomitant severe degradation are believed to be part of the cause for agitation and restiveness amongst various groups particularly the youths of the affected areas (Egwu, 2012). It has also generated other social – political issues/ controversies and to a large extent imbroglio in that region such as massive corruption, unemployment, alleged neglect, absence of sustainable development, finger-pointing between communities and oil companies as to causes of oil spills, equitable compensation and lack of political will on the part of the government to protect lives and properties and punish oil polluters (Egwu, 2012).

Egwu (2012) emphatically stated that oil spills can cause enormous damage to the soil, plants and animals as well as cause serious human hazards and destruction of economic and social activities. In in the Delta areas of Nigeria, it has led to loss of many lives, destruction of arable farmlands, fishing industry, recreational facilities, cultural areas and polluted water and air (Egwu, 2012). Beyond ecological damage, oil spill disaster

can cause fundamental changes in the way the public think about oil, oil industry and transport of petroleum products by tankers (Egwu, 2012). Of the greatest concern is the long-term effects of both acute and chronic contamination that can cause diseases (cancer in various forms, rashes in children) etc for decades of such oil spills. The incidence of tumors and other histopathological disorders in bottom-dwelling fish and shell fish from contaminated coastal areas has suggested a possible link between levels of lipophilic organic contaminants (such as Polycyclic Aromatic Hydrocarbon) and increased incidence of histopathological conditions (US National Research Council [NRC], 2005). Jike (2004) opined that several years after the Egbema spillage disaster, an avalanche of devastating spillage disasters were witnessed in Jesse, Oviri-Court, Evwreni, and Ekakpamre, all in the Delta State of Nigeria.

Aside from the deleterious impact of oil exploitation, and more ills associated with oil industry, there are several socio-cultural setbacks suffered by the communities. Itinerant oil field workers find the teenage girls in their immediate host communities a ready pool with which to gratify their sexual urge. In each exploration site, these migrant oil workers leave behind an amazing corpus of venereal diseases and morally polluted girls and school drop-outs (Agahlino 2000). Likewise, the displacement of certain villages in the Niger Delta has seriously affected their social and cultural lives. For example, the forceful displacement of Igolu village in Isoko land as a result of massive oil spillage in 1973 at Shell's location 13 and 18 has posed for the villagers, problem of social and cultural adjustments" (Eniola, et.al. 1983). Most societal life support systems like village gods and divinities have been violated. Yet, unlike labour-intensive agricultural practices, the petroleum industries offer little or no employment to the displaced people in the sub-region (Agahlino, 2000).

According to Owolabi (2012), the Niger-Delta region of which Delta State is part of is dominated by rural communities which, because of the favourable natural conditions, depend chiefly on farming and fishing. According to a UNDP Report (2006), more than 70% of the people in the region depend on the natural environment for livelihood. Hence, poor people are vulnerable to environmental dynamics because natural hazards, biodiversity loss and forest depletion, pollution and the negative impact of industrialization vis-à-vis oil exploration leaves them marginalised and with no legitimate means to survive.

Furthermore, the United Nation Development Programme Report on the Niger-Delta (2006) underscores the squander and poverty in the region despite the huge oil resources and hefty foreign exchange earnings for the country. The report noted that oil wealth in the region accounted for more than 45% of the country's foreign earning. The report noted that the Niger Delta is a region suffering from administrative neglect, crumbling social infrastructure and service, high unemployment, social deprivation, abject poverty and endemic conflicts.

In a similar vein, Frynas (1998) stated that the Niger-Delta's tremendous potential for economic growth and sustainable development remains unfulfilled as its future is threatened by deteriorating economic conditions that are not being addressed by present policies and acts of government. The magnitude of environmental degradation in the Niger Delta highlighted led to restiveness among the indigenes of the area, particularly among the youths (Owolabi, 2012). Vehement protest against the activities of oil prospecting firms, less stringent environmental protection laws and lackadaisical attitude of the government led to the killing of Ken Saro-Wiwa and the Ogoni Nine by the Military regime of Late General Sanni Abacha in 1995 yet it seems no lessons have been learnt.

The relationship between health and the environment are inextricably linked as demonstrated in The World Health Organisation (WHO, 2011) "Environmental health addresses all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviours. It encompasses the assessment and control of those environmental factors that can potentially affect health. It is targeted towards preventing disease and creating health-supportive environments. This definition excludes behaviour not related to environment, as well as behaviour related to the social and cultural environment, and genetics."

The interdependence and the interconnectedness of human health with the health of the natural environment is a relationship formally acknowledged by the World Health Organisation and identified as interrelated with the conditions and resources needed for health. The Ottawa Charter for Health Promotion (WHO, 1986) states that: "The fundamental conditions and resources for health are peace, shelter, food, income, a stable ecosystem, sustainable resources, social justice and equity." The environmental influences and determinants of health can be considered in terms of the natural environment, the built environment and the individual's responses to environmental influences (Veitch, 2009).

As evidenced by the unfortunate Jesse and Oviri court incidents, oil pipeline vandalization can cause fire disasters with tragic consequences. Many lives are lost in a most sudden tragic, and violent manner when fire is mistakenly ignited (Lawal and Ese, 2012). When pipelines are vandalized, oil spill and marine organisms may become contaminated by poly-nuclear aromatic hydrocarbon (PNAS). Thus because many organisms such as oysters, crabs, lobsters, mussels and many types of fin fish are often part of man's diet their contamination could be a threat to human health (Lawal and Ese, 2012).

Olokesusi (1987) support the above assertion by identifying the following harmful effects of oil spillage

which kills plants and animals in the estuarine zone; fish barnacles, mussels, crabs, planktons and rock weeds are the hardest hit. In the Nigerian coastal environment, large areas of mangrove ecosystem have been destroyed, oil settles in the beaches and also settles on the floor of the ocean sand which kills botanic organisms. Those of the organisms that survive may accumulate toxics in their tissues making them unfit for human consumption. The poisoning of algae may disrupt major food chains and eventually decrease the yield of edible fish. Oil endangers fish pond in coastal waters and contaminates the flesh of commercially valuable fish. Sea birds are not exempted from this onslaught (Lawal and Ese, 2012).

The sea and river reduce the coastal amenities and threaten the survival of sea animals. Oil spillage destroys farmlands, pollute drinkable water and causes drawbacks in fishing of coastal waters. It is therefore important to greatly examine the environmental impact of pipeline vandalization in the Niger delta Region (Lawal and Ese, 2012).

Human health and the well-being of present and future generations are dependent on restoring and protecting the integrity of the natural systems which support life in the natural environment and minimising the human impact that has negative impact on ecologically sustainable development. It is understood to mean: using, conserving and enhancing the community's resources so that ecological processes, on which life depends are maintained and the quality of life, for both present and future generations, is increased (Department of Sustainability, Environment, Water, Population and Communities, Australia's National Strategy for Ecologically Sustainable Development, 2002). Most of the oil spill contaminated sites containing appreciable amount of heavy metals and other contaminants that could affect the health of people living in the neighbourhood of such disaster area (Egbe and Thompson, 2010).

The concentration of trace elements like Cr and Ba detected in oil spill sites of the Gulf war were higher than permissible safe limits. Skin contact with certain chromium compounds can cause skin ulcers. Ingesting large amounts of chromium can cause stomach upset and ulcers, kidney and liver damage and even death (Egbe and Thompson, 2010). The health effects of barium depend upon the water-solubility of the compounds. Small amounts of water-soluble barium may cause a person to experience breathing difficulties, increased blood pressures, heart rhythm changes, stomach irritation, muscle weakness, changes in nerve reflexes, swelling of brains and liver, kidney and heart damage. Serious respiratory problems witnessed in many communities can be linked to environmental pollution. According to Omofonmwan and Odia, (2009) respiratory problems, coughing up blood, skin rashes, tumours, gastrointestinal problems, different forms of cancer, and malnourishment, were commonly reported ailments in many communities. Ojeh (2012), Atuma and Ojeh (2013) reported that the threat to human, fauna and flora life posed by pollution due to gas flaring cannot be over-emphasized because gas flared often resulted in some environmental degradation, one of such influence is soil pollution and poor crop yield and this they observed was responsible for poor soil and low cassava productivity in Ebedei, Ukwuani LGA, Delta State.

At the moment, the Niger Delta is best known as a region that sustains much oil exploration and exploitation by the agents of western economic powers. The Niger Delta basin is considered the mainstay of the Nigerian economy for its significantly high level of oil reserves. The region is also naturally endowed with viable deposits of hydrocarbon and gas reserves. Petroleum and derivatives dominate the Nigerian economy making up about 98 percent of exports, over 80 percent of government's annual revenue and 70 percent of budgetary expenditure (Ohwofasa, Anuya, & Aiyedogbon, 2012).

The oil producing communities of Delta State as found in other oil producing communities in the Niger Delta area of Nigeria are crisscrossed by thousands of kilometers of pipeline, punctuated by wells and flow stations. Much of the oil infrastructure is located close to the homes, farms and water sources of communities. At night often the only light visible for miles are from flares burning unwanted gas. In the process of extracting oil in the past five decades, ecological devastation, on the one hand, and neglect arising from crude oil production, on the other hand, has left much of the Niger Delta desolate, uninhabitable, and poor.

One fundamental problem that faces the oil producing areas today is the degradation of its environment. The fact is incontrovertible that the environment of the Niger Delta has been intensely polluted with tragic consequences for the economy of the people and the totality of the quality of life (Babatunde, 2010). A significant feature of the socio economic life of the Niger Delta people is environmental degradation and is largely the outcome of pollution and unsustainable exploitation of natural resources. According to Ibaba (2010) the unsustainable exploitation of the environment in the Niger Delta is blamed on the inability or failure of the environmental laws to correctly acts in attitudes and beliefs, which impacted negatively on the environment.

Despite the enormous resources in the oil producing areas and its subsequent contribution to the federal government revenue, not much is done by ways of developing the area. Instead the people of these areas continue to suffer oil degradation through pollution of the environment, gas flaring and oil spillage. The multinational companies operating in these areas have tended to undermine the yearnings and aspirations of the people by not giving adequate compensation resulting from the environmental degradation.

To a considerable extent, the geographical location of the Delta State where these oil producing

communities are located and its resources determine the traditional occupation of the people: fishing and farming. But politics is the major issue of the day in the area. This is mainly due to the long neglect of the people's welfare by the Federal Government of Nigeria and the nonchalant attitude of the oil multinationals. The people of the oil producing areas believe that they have no substantial benefit to show for their sacrifices, despite being the 'goose that laid the golden egg' – the economic success that underpins the unity of the Nigerian state. This has led to a series of crises in these areas in particular and the Niger Delta region in general which assumed horrendous dimensions in the early 1990s with the emergence of social movements and militant youth groups that began to challenge not only the Nigerian state but also the policies, attitudes, and activities of the multinational oil companies (MNOCs) in the region. . It is on the basis of these enumerated problems that this study was embarked on to provide insight on the effects of Environmental Degradation on Human Health in the oil producing communities as well as examine the level of compliance of oil companies on the limits set for hydrocarbon emissions in terms of gas flaring and other environmental degrading emissions.

2 THEORETICAL ISSUES AND METHODS OF DATA COLLECTION

Environmental Externality is the theoretical framework on which this work is based. Environmental Externalities are damages or benefits which are not paid for by the polluter or beneficiary under normal market condition (Iyoha, 2002). Externalities are defined as the costs or benefits which arise when the social economic activities or production system of one group of people have a positive or negative impact on another and in which the first group may fail to fully account for their impact (Baumol and Oates, 1988).

It is very obvious that every economic activity or production of man on the environment, including oil and gas prospecting and production, has detrimental effects or externalities on the ecosystem health. In effect, every productive enterprise generates externalities/damages to others in the course of their production (Helm and Pearce, 1991). Environmental externality theory is pioneered by Pigou in his seminal work (Schouten and O'Sullivan, 1987). The concept of externality has been well established in the theory of economics. However, it is only since the 1960s that environmental externalities have received a lot of attention, both in terms of quantification and actions to internalize them.

The theory of externalities demonstrate the need for a set of Pigouvian taxes (subsidies) on the generators of an externality or damage to induce them to take proper account of the full range of social costs that their activities entail (Okuoyibo, 2006; Atuma and Ojeh, 2013). Adopting the framework of a market economy and perfect competition, Pigou established that when there are externalities, private and social cost are not equated, nor are private and social benefit equal.

Thus, the social cost which damages are born by the receptors of production activities are not equal with that which the polluter bears. Environmental impacts of gas flaring and oil spillage are clearly externalities since they are perfect examples of circumstances where the damages are not fully reflected in potential or actual market exchanges (Atuma and Ojeh, 2013). These externalities are caused by market failures resulting from incomplete markets (Ayodele, 1988). Government failure arises from the implementation of erroneous policies, ignorance and incomplete information (Enahoro and Ehi-Ebewele, 2008). Both market failure and government failure have resulted and is till resulting in an excessive use of environmental resources, which leads to environmental degradation.

However it is important to understand here that the externality costs or negative externalities will be considered in the study. External cost or negative externality is any loss of human wellbeing associated with a process that is not already allowed in its price (Iyoha, 2002). A good example is the oil spillage and gas flaring pollution, which the benefit oriented production of the oil companies produces detrimental effects on the people and their environment (Soil, vegetation, water, air, agriculture, etc) (Atuma and Ojeh, 2013). In the same vein, the uncontrolled and carefree attitude with which the oil industries in Nigeria flare gas leave vast areas of the Niger Delta, particularly the oil bearing communities bare and impoverished. This adversely affects the entire well-being of the people living in the area. This theory of environmental externalities is relevant to this study because it is use as a construct to assess the effects of oil spillage and gas flaring which drive environmental degradation that affect human health on various fonts.

The study adopts a literature and survey design. Hospital data comprise in-and-out patients of diseases linked to oil productions such as bronchitis, cough, asthma, cardiovascular diseases, eye infection and skin infection from the Government hospitals or clinics located in Okpai, Kwale, Benekuku, Ubeji, Bomadi, Ekakprame, Erhoike, Afiesere and Uzere for a year. One year hospital data was used based on data availability and consistence on the required ailments such as bronchitis, cough, asthma, cardiovascular diseases, eye infection and skin infection. However, the data for oil spillage was collected from the archive of the National Oil Spill Detection and Response Agency (NOSDRA), in Warri Regional Office while the gas flaring data was collected from the Nigerian National Petroleum Corporation (NNPC) in Warri. Questionnaires were administered to the household heads of dwellers of oil producing communities based on stratified random sampling technique. Based on this, 450 copies questionnaires were administered to the nine (9) oil producing

communities, with fifty copies each administered to each community. The questionnaire was designed to elicit information on the relationship between environmental degradation and health. Descriptive statistics were used to summarize the data and cluster and principal component analysis using ‘Statistica’ software version 12.0 on windows was used for the analysis of data.

3 RESULTS AND DISCUSSION

3.1 Factors of Environmental Degradation in Oil Producing Communities.

Table 1 and fig 2 showed that the respondents in the oil producing communities to a large extent have experienced and still experiencing environmental degradation. Accordingly, the responses were affirmative for Okpai (89%), Kwale (100%), Benekuku (82.5%), Erhoike (95.6%), Afiesere (100%), Ekakprame (100%), Ubeji (100%), Uzere (100%) and Bomadi (89%) respectively. This implies that environmental degradation is a key concern for the citizens of the oil producing communities where oil, a major contributor to Nigeria’s economic GDP is located. While this leave the people more impoverished and agitated is not new as several researchers have classified the Niger delta as where the Vulture feeds, and leaves her carcass. This means that amnesty programme without fixing the degraded environment is just a palliative measure to curbing the agitation of the people of the oil producing areas.

Table 1: Experience of Environmental degradation in community

Communities	Respondents	
	Yes	No
Okpai	40 (89%)	5 (11%)
Kwale	45 (100%)	0 (0%)
Benekuku	33 (82.5%)	7 (17.5%)
Erhoike	22 (95.6%)	1(4.4)
Afiesere	45 (100%)	0 (0%)
Ekakprame	45 (100%)	0 (0%)
Ubeji	43 (100%)	0 (0%)
Uzere	42 (100%)	0 (0%)
Bomadi	40 (89%)	5(11%)
Total	355 (95.2%)	18 (4.8%)

Source: Fieldwork, 2013

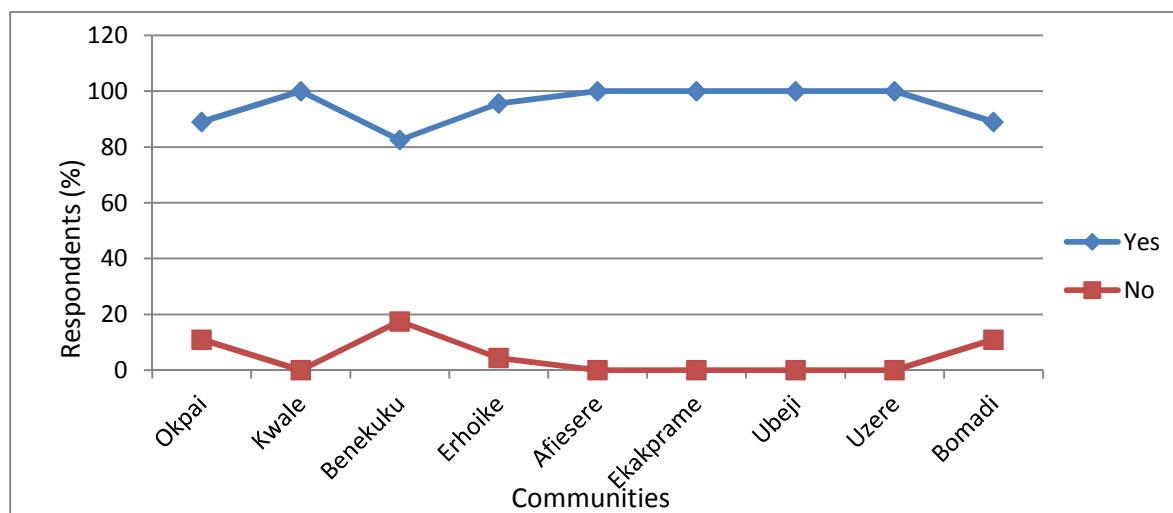


Fig 2: Experience of environmental Degradation

Types of Environmental Degradations Experienced

Table 2 and fig 3 showed that environmental degradation of various sort are prevalent in oil producing communities of Delta State. The percentage mean of all responses from the respondents in the nine oil communities being studied revealed that flooding/bad roads is the most popular degradation to the environment with 82.5% agreement across all communities. The next most environmental degradation factor is the destruction of vegetation and farmlands by oil companies with 57.1% and gas flaring (53.6%). Others, in the order of degradation are oil spillage (49%), air pollution from oil and gas processing (43.3%), destruction of seabed by

dredging activities (40.7%), water pollution from effluents from oil companies (28.9%), deck drainage and spillage during loading operations (16.7%), land pollution from effluents from oil companies (15.6%), noise pollution from vibration seismic shooting of oil companies (12.4%), Water pollution from effluents (10%) and accumulation of solid waste from drilling materials (5.1%) respectively.

Table 2: Types of Environmental Degraders Experienced

Communi- ties	Environmental degradation common to community											
	OS	GF	DVF	NP	AT W	AP	WP	DDSL O	LP	DSD	WPEC	FBR
Okpai	0	45	45	0	0	41	0	0	0	0	0	45
Kwale	45	45	40	15	23	0	0	40	35	40	0	45
Benekuku	0	40	0	0	0	0	0	0	0	0	0	40
Erhoike	0	23	23	0	0	23	0	0	0	23	0	23
Afiesere	0	0	0	0	0	0	0	0	0	40	0	45
Ekakpram e	45	0	27	0	0	45	0	0	0	45	0	45
Ubeji	43	43	40	41	0	43	0	0	0	0	43	43
Uzere	42	0	42	0	0	0	0	0	0	0	42	42
Bomadi	45	45	40	0	0	43	45	35	35	35	45	45
Total	220 49 %	241 53.6 %	257 57.1 %	56 12.4 %	23 5.1%	195 43.3 %	45 10 %	75 16.7%	70 15.6 %	183 40.7 %	130 28.9%	373 82.9 %
Mean	24.4	26.8	28.6	6.2	2.6	21.7	5	8.3	7.8	20.3	14.4	41.4

Source: Fieldwork, 2013

OS- Oil Spillage

GF- Gas Flaring

DVF- Destruction of vegetation & Farmlands

NP- Noise Pollution from Vibration seismic shooting of oil companies

ATW- Accumulation of toxic waste from drilling

AP- Air pollution from gas & oil processing

WP- Water Pollution from ballast & tank washing

DDSL- Deck drainage & spillage during loading operations

LP- Land pollution from effluent water

DSD- Destruction of seabed by Dredging

WPEC- Water Pollution from Effluents

FBR- Flooding/bad roads

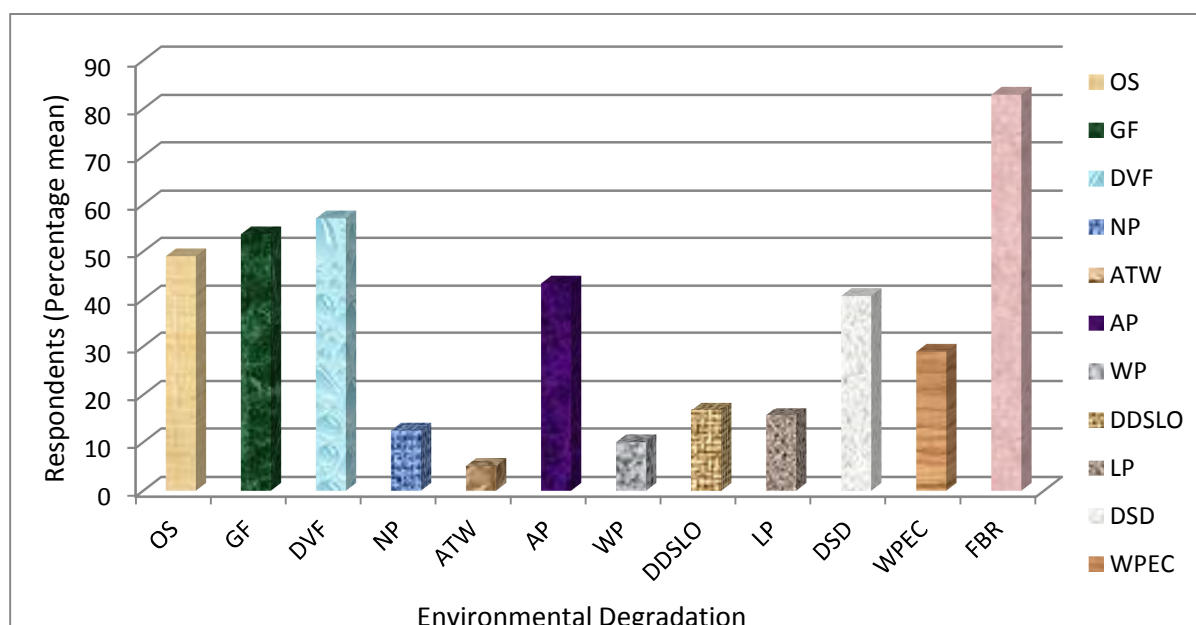


Fig 3: Featured Environmental Degradation Common to Oil Communities in Delta State.

Major Cause of Environmental degradation in communities

From table 3 and fig 4, the overall major cause of environmental degradation in all the oil producing communities is the negligence of duty by government agencies charged with oversight duties of monitory and compliance (30.8%), Neglect of Environmental regulations/compliance (26.8%), corruption (23.6%), Lack of Environmental Impact Assessment (EIA) reports from Companies either at the beginning of the project or periodic assessment (14.7%) respectively. However, 4% of all respondents spotted Lack of Environmental laws as the least problem causing environmental degradation in the areas. The implication of this is that attitudinal change will help on the long run to stop or minimize environmental degradation in the region.

Table 3: Major Cause of Environmental degradation in communities

Communities	Respondents				
	Lack of Environmental laws	Negligence of duty by government agencies	Lack of EIA reports from Companies	Neglect of Environmental regulations/compliance	Corruption
Okpai	0 (0%)	20 (44.4%)	12 (26.7%)	10 (22.2%)	3 (6.7%)
Kwale	5 (11.1%)	10 (22.2%)	3 (6.7%)	17 (37.8 %)	10 (22.2%)
Benekuku	1 (2.5%)	15 (37.5%)	9 (22.5%)	10 (25%)	5 (12.5%)
Erhoike	2 (8.7%)	15 (65.2%)	0 (0%)	3 (13%)	3 (13%)
Afiesere	1 (2.2%)	4 (4.4%)	0 (0%)	10 (22.2%)	30 (66.7%)
Ekakprame	0 (0%)	18 (40%)	2 (4.4%)	20 (44.4%)	5 (11.1%)
Ubeji	3 (6.9%)	18 (41.9%)	2 (4.7%)	10 (23.3%)	10 (23.3%)
Uzere	3 (7.1%)	10 (23.8%)	17 (40.5%)	10 (23.8%)	2 (4.8%)
Bomadi	0 (0%)	5 (11.1%)	10 (22.2%)	10 (22.2%)	20 (44.4%)
Total	15 (4%)	115 (30.8%)	55 (14.7%)	100 (26.8%)	88 (23.6%)
Mean	1.7	12.8	6.1	11.1	9.8

Source: Fieldwork, 2013

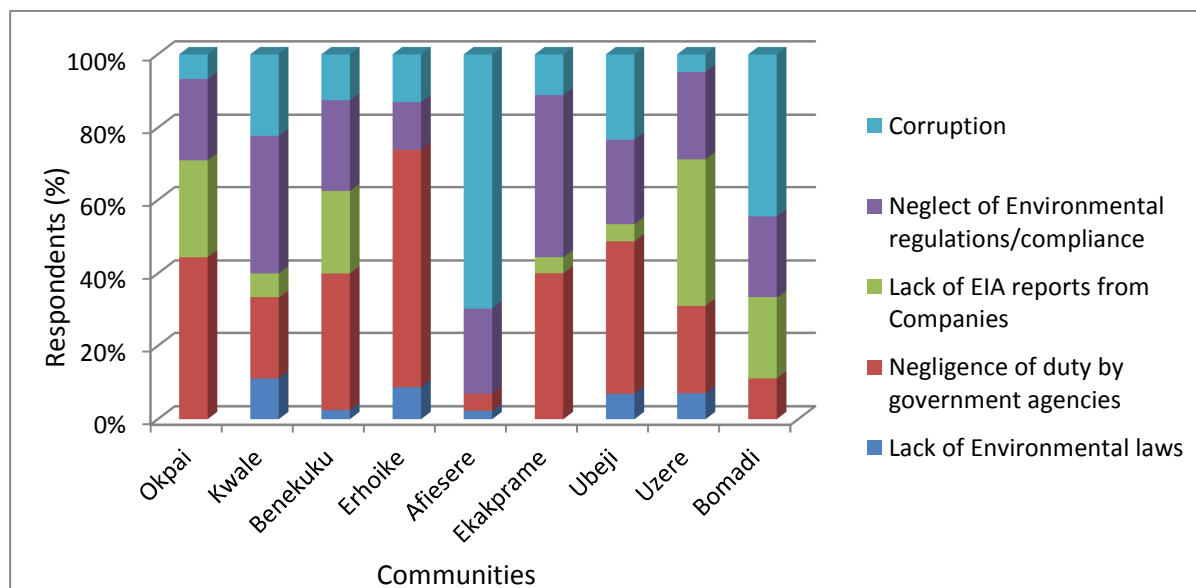


Fig 4: Major cause of Environmental Degradation in communities

3.2 The Effects of Oil Spillage on Human Health in Oil Producing Communities.

Table 4 and fig 5, all the respondents in each community agreed that they were vulnerable to environmental degradation but few of them agreed to that at Afiesere (33.3%). In the rest communities, 82.2% were vulnerable in Okpai, 77.8% in Kwale, 72.5% at Benekuku, 82.6% at Erhoike, 73.3% at Ekakprame, 97.7% at Ubeji, 95.2% at Uzere and 86.7% at Bomadi. In all, 77.5% of the residents in oil producing communities were vulnerable to environmental degradation while 22.5% were not during the period of study. The implication of this high vulnerability to environmental degradation by the people of these oil producing communities in Delta State shows that something must be done urgently to make living conditions better in these areas for them to be resilient to oil activities which will continue to increase in the area. This agrees with Sagay et al (2011) who observed that most internal conflicts in the country today have strong environmental root and that the inability of

the government to address such environmental problems have had great effects on the security problem currently facing the Nigerian State today.

Table 4: Vulnerability to Environmental Degradation

Communities	Respondents	
	Yes	No
Okpai	37 (82.2%)	8 (17.8%)
Kwale	35 (77.8%)	10 (22.2%)
Benekuku	29 (72.5%)	11(27.5%)
Erhoike	19 (82.6%)	4 (17.4%)
Afiesere	15 (33.3%)	30 (66.7%)
Ekakprame	33 (73.3%)	12 (26.7%)
Ubeji	42 (97.7%)	1(2.3%)
Uzere	40 (95.2%)	2 (4.8%)
Bomadi	39 (86.7%)	6 (13.3%)
Total	289 (77.5%)	84 (22.5%)

Source: Fieldwork, 2013

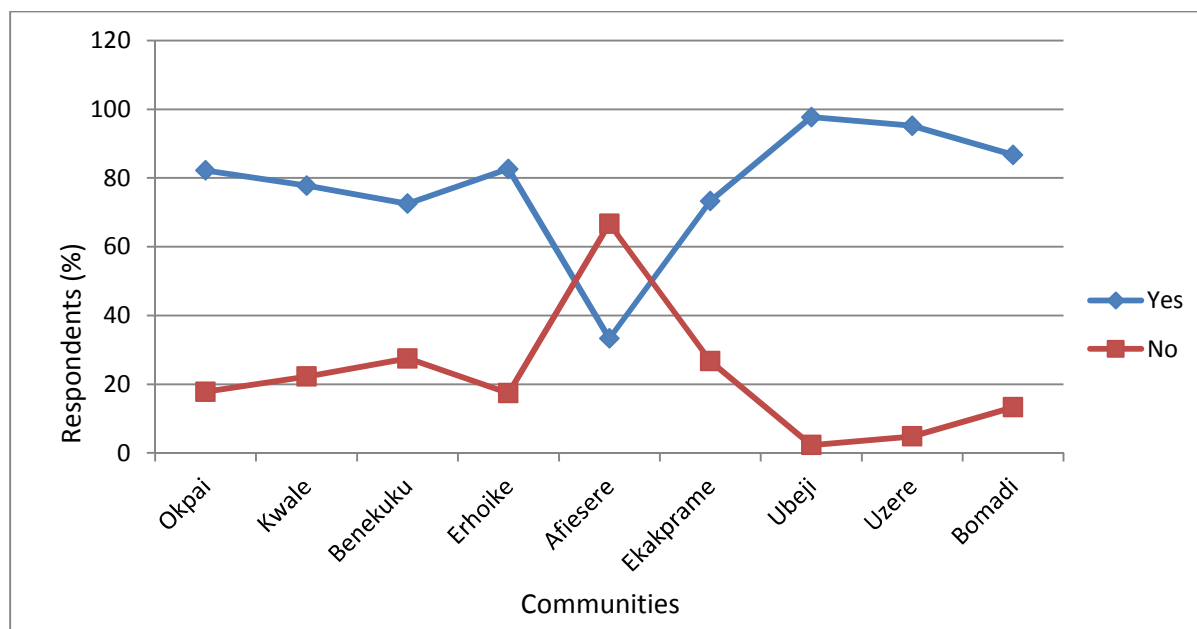


Fig 5: Vulnerability to Environmental Degradation

Hospital Admission and type of Illness Reported

Table 5 and fig 6 reveals that a total of 235 Diarrhoea cases were recorded, 187 Asthma cases, 511 cases of eye infection, 90 cases of Bronchitis and 157 cases of skin infection were reported at the hospitals in the area. This high figure could be linked to environmental degradation of air, water and land which is rampant in the area.

Table 5: Hospital Admission and type of Illness Reported for 1 year

Name of Hospital	Diarrhoea	Asthma	Eye Infection	Bronchitis	Skin Infection
General Hospital Ughelli (Ekakprame, Afiesere & Erhoike)	80	80	370	35	23
Bomadi Central Hospital	40	35	5	10	10
Warri Central Hospital (Ubeji)	70	55	110	45	98
Oleh Hospital (Uzere)	10	7	6	0	21
Kwale General Hospital	35	10	20	0	5
Total	235	187	511	90	157
Mean	47	37.4	102.2	18	31.4

Source: Hospital Records of GHU, BCH, WCH, OH & KGH, 2013

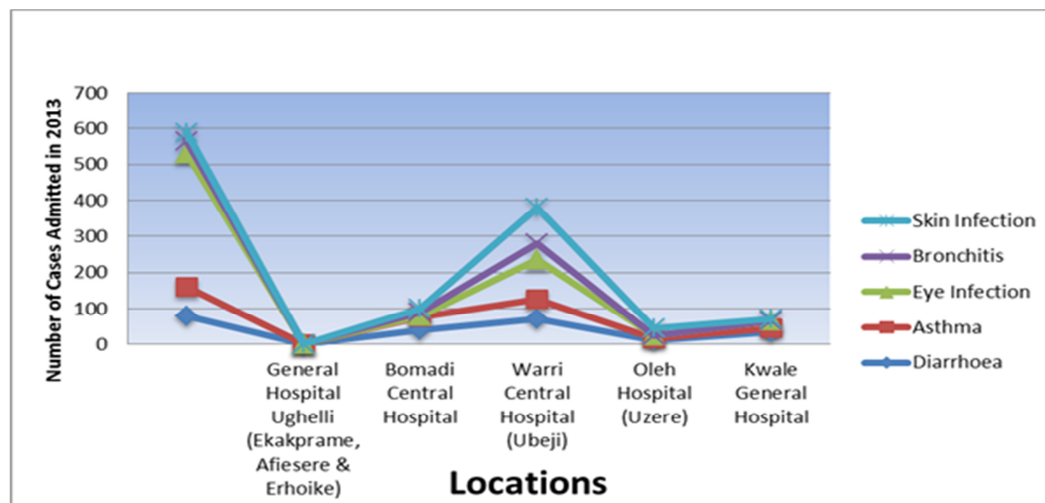


Fig 6: Types of illness and Admission rate

Selected Oil Spillage Occurrence in Delta State Oil producing Areas

Table 6 above shows the oil spillage data from oil producing communities in Delta State which occurred in our area of study or close by to the area of study. From the table, the greatest spillage occurred in 12" Kokori Eriemu line at Agbarra when 306.14 billion barrel of crude was spilled through sabotage and the least was in Ogini Well 7 L/S where 0.0129 billion barrels occurred as a result of sabotage. In fact from the table, most of the oil spillages is traceable to sabotages.

Table 6: Selected Oil Spillage Occurrence in Delta State Oil producing Areas

S/N	Location of Spill	Cause of Spill	Quantity of Spill (bbl)	Rank
1	Utorogu- Otu-jeremi	Sabotage	25	7
2	Tunu Well	Eqf & Sab	6	18
3	Jones Creek	Eqf	2	26
4	Ogini Well 14 L/S	Sab	0.5661	30
5	Erienu	Sab	5.1	20
6	Kokori Flow station line	Sab	1	28
7	Otumara Flow Station	Eqf	0.0352	35
8	Afiesere Well 29 T Row	Sab	225.811	2
9	Ogini Well 7 L/S	Sab	0.0129	37
10	Olomoro well 8 Row	Sab	0.327	32
11	24" Amukpe- Rapele @ Jakpa	Eqf	1	29
12	20" UPS-WRPC T/L @ Ekpan	Sab	0.025	36
13	20" UPS-WRPC T/L @ Ugboimro	Sab	0.22	34
14	Uzere Well 14	Sab	15	9
15	Uzere Well 17	Sab	10	11
16	Well 8L4" Flowline @ Otumara	Eqf	1.79	27
17	10" Utorogu Up ST/L @ Iwhrekan	Eqf	8.91	16
18	10" Utorogu Up ST/L @ Ughevwigie	Eqf	3.51	24
19	10" Utorogu UP ST/L @ Ughevwigie2	Eqf	2.49	25
20	Otumara Well 6 Flowline (4" pipe)	Sab	33.52	6
21	24" Amukpe- Rapele TL @ Orere Uluba	Sab	0.23	33
22	10" Utorogu Ups T/L @ Ughevughe	Eqf	14.38	10
23	8" Oroni to Ewvreni T/L @ Enhwe	Sab	48.85	5
24	Kanbo well 5	Sab	0.35	31
25	12" Kokori Eriemu line @ Agbarra	Sab	306.14	1
26	16" South Forcados @ Oviriolomu	Cor	18.68	8
27	Kwale	Sab	5	21
28	Kwale	Sab	10	12
29	Irri/Kwale Pipeline @ Ofagbe	Sab	5	22
30	Beneku Area (Kwale)	Sab	10	13
31	Okpai 7L4" flowline	Sab	10	14
32	10" Kwale/Akri P/L @ Agwa Etiti	Sab	6	19
33	Okpai 12" F/L @ Beneku	Sab	5	23
34	10" Irri/Kwale P/L @ Ofagbe	Sab	10	15
35	Okpai 7L4" F/L	Sab	7	17
36	10" Irri/Kwale P/L @ Ofagbe	Sab	180	3
37	10"Kwale/ Akri @ Agwa Etiti	Sab	95	4

Source: National Oil Spill Detection and Response Agency (NOSDRA), 2013

- Sab= sabotage; Eqf= equipment fault; Cor= corrosion, @=at

Environmental Degradation and health Impact

Table 7 and fig 7, loss of farmland and polluted air to environmental degradation was moderately severe and loss of domesticated livestock and loss of family members was low in terms of severity of effects. However, the index with high severity of impact from environmental degradation were polluted rivers/streams and hotter outdoor environment. This attest to why the case of diarrhoea and eye infection admission is also high in the area (Table 4.5). Also the case of Asthma admission appear to be moderate because it is linked to polluted air which is moderately severe in terms of degradation level of index.

Table 7: Environmental Degradation and health Impact

Environmental Degradation Index	3-High	2-Moderate	1-Low
Loss of farmland	60	259	54
Polluted rivers/Streams	207	100	66
Hotter Outdoor Environment	287	96	80
Polluted air	111	215	47
Loss of domesticated livestock	99	67	207
Loss of family members	8	50	315

Source: Fieldwork, 2013

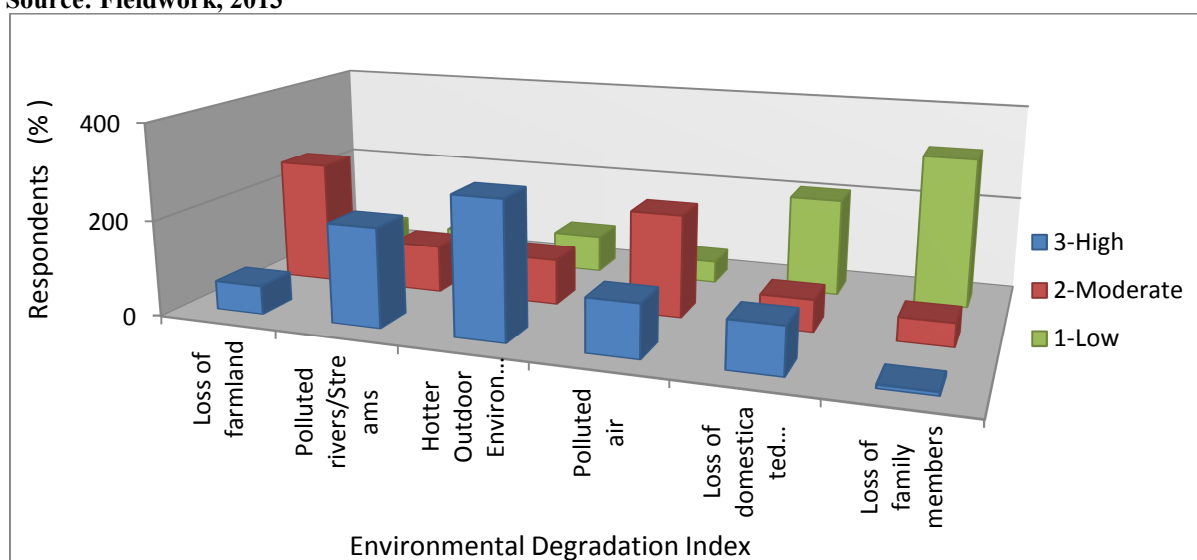


Fig 7: Impact of Environmental Degradation in order of severity

Frequency of Visit to Hospital

Table 8 showed that the people of the area rarely visit the hospital (72.2%), a few do visit the hospital on a seasonal basis (15.8%) and even fewer (11.5%) visit the hospital once in a month. Most of the respondents said they visit more of chemist shop than hospital because it is closer to them and they do not need to waste so much of money on transport and waiting for the doctor at the hospital. Therefore, one can imply that it is only severe cases that were reported in the hospital as seen in table 5 above.

Table 8: Frequency of Visit to Hospital

Communities	Respondents			
	Once a Week	Once a month	Seasonally	Rarely
Okpai	0	3	10	32
Kwale	0	5	5	35
Benekuku	0	2	8	30
Erhoike	0	3	10	10
Afiesere	0	5	5	35
Ekakprame	0	5	10	30
Ubeji	0	1	4	38
Uzere	0	4	2	36
Bomadi	0	15	5	25
Total	0 (0%)	43 (11.5%)	59 (15.8%)	271 (72.7%)

Source: Fieldwork, 2013

3.3 The effects of gas flaring on human health in the study area.

Table 9, revealed that in the oil producing communities in Delta State, about 69.3% of all the gas produced were flared during the study period. It was as high as over 95% in most communities like Agbara, Uzere East and West, Ughelli West, Ovhor, Opukushi.

Table 9: Gas flaring in Delta State Oil Producing Areas

S/N	Name of Field	Gas Produced (mscf)	Gas Flared (mscf)	% Flared
1	Afiesere	3,257,632	844193	25.9
2	Eriemu	188,370	174072	92.4
3	Ewreni	271,064	252170	93.0
4	Olomoro/Oleh	4,707,174	1759593	37.4
5	Opukushi North	979,368	972890	99.3
6	Oweh	624,959	595484	95.3
7	Otumara	6,576,132	2903750	44.2
8	Ughelli East	16,708,684	819396	4.9
9	Ughelli West	909,095	888777	97.8
10	Utorogu	89,264,465	1646150	1.8
11	Uzere East	1,067,224	634477	59.5
12	Uzere West	713,191	421667	59.1
13	Akri	20,286,275	16815139	82.9
14	Kwale	77,705,154	61546853	79.2
15	Agbara	9,663,197	9356457	96.8
16	Afiesere/Eriemu	57,124,000	31617000	55.3
17	*Afiesere	1,218,291	351687	28.9
18	Ewreni	260,742	248355	95.2
19	Isoko	180,454	162025	89.8
20	Olomoro/Oleh	2,238,131	943583	42.2
21	Opukushi North	536,490	532953	99.3
22	Opukushi	2,305,714	2283677	99.0
23	Otumara	3,538,279	2523320	71.3
24	Ovhor	434,111	431946	99.5
25	Oweh	176,655	163650	92.6
26	Ughelli East	15,739,129	1995010	12.7
27	Ughelli West	966,910	2515854	98.0
28	Uturogu	93,661,230	709516	2.7
29	Uzere East	749,732	947936	94.6
30	Uzere West	596,238	589546	98.9
31	Agbara	6,713,476	6672816	99.4
	% Mean (flared gas)			69.3%

Source: Extracted From NNPC Annual Statistical Bulletin, 2013.

***mscf = thousand standard cubic feet**

3.4 The level of social divide on livelihood support from pollution in the area.

Table 10 and fig 8 showed that 18.5% of the people were engaged in crop farming, 11.5% on fish farming, 26.3% on trading and 46.4% on office jobs respectively. However, the different communities have a mix of the different source of livelihood with regards to the particular environment. For instance, Bomadi people were more into fish farming than any other

Table 10: Source of Livelihood

Communities	Respondents			
	Farming (crop)	Farming (fish)	Trading	Others e.g Office jobs
Okpai	10	2	13	30
Kwale	5	3	17	20
Benekuku	5	5	10	20
Erhoike	15	0	3	5
Afiesere	5	0	15	25
Ekakprame	10	1	5	29
Ubeji	0	10	20	13
Uzere	10	2	10	20
Bomadi	9	20	5	11
Total	69 (18.5%)	43 (11.5%)	98 (26.3%)	173 (46.4%)

Source: Fieldwork, 2013

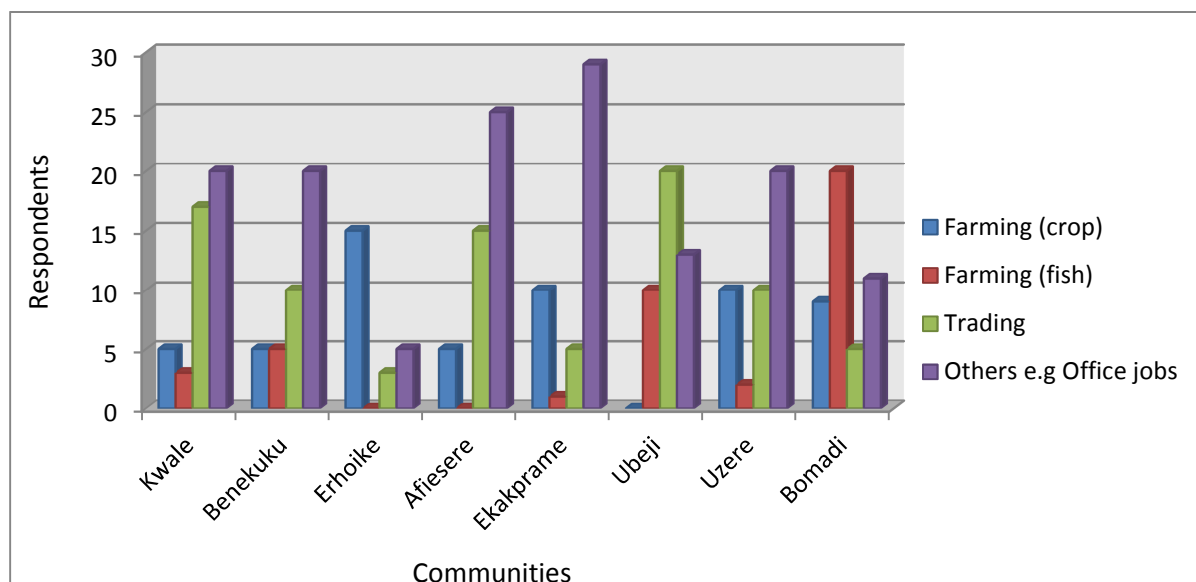


Fig 8: Source of Livelihood

Social divide from former source of livelihood

Table 11 and fig 9, showed that 85.8% of the people have never been disconnected from their job as a result of oil related environmental degradation but 14.2% of the people have had disconnect from former source of livelihood as a result of oil related activities causing environmental degradation that affect the oil producing communities in Delta State.

Table 11: Social divide from former source of livelihood as a result of Environmental degradation

Communities	Respondents	
	Yes	No
Okpai	6	39
Kwale	5	40
Benekuku	9	31
Erhoike	5	18
Afiesere	2	43
Ekakprame	1	44
Ubeji	8	35
Uzere	7	35
Bomadi	10	35
Total	53 (14.2%)	320 (85.8%)

Source: Fieldwork, 2013

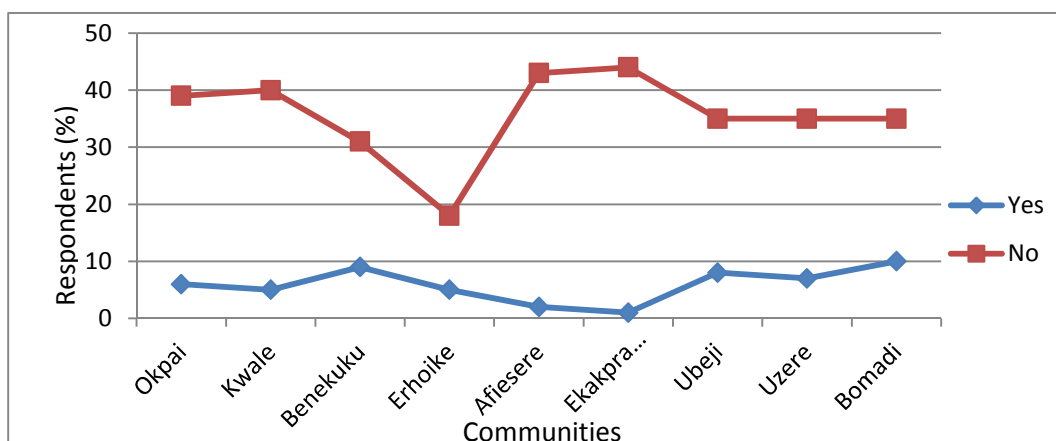


Fig 9: Disconnect from source of livelihood as a result of environmental Degradation

4 Conclusion

The study examined the effects of environmental degradation on human health with focus on nine (9) oil producing communities in Delta State. The study revealed that oil spillage and gas flaring and indeed environmental degradation have grave effects in the environment especially in the area of study, which ranges from its effect on the land, water to its effect in the entire out door environment. Apart from affecting the chemical properties of the soil, it also resulted to poor soil fertility or nutrient, leading to poor crop productivity in the area as well as polluting of rivers and streams where fishing activities were carried out for subsistence up keep of the family. However, it is worthy to note that oil spillage and gas flaring affects agricultural and economic activities of oil host communities in Nigeria and at the current rate of spillage and flaring in most of the communities, life may not be sustainable in these areas in the future if the current trend is not stalled. Therefore, both the government and the oil companies should keep up to the challenges of monitoring, evaluating and managing the oil drilling environment for a sustainable environmental development.

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