European Journal of Business and Social Sciences, Vol. 4, No. 08, **November 2015.** **P.P. 14 - 30**
URL: *http://www.ejbss.com/recent.aspx-/*
ISSN: 2235 -767X

EFFECTS OF OIL SPILLAGE ON HUMAN HEALTH IN PRODUCING COMMUNITIES OF DELTA STATE, NIGERIA

Prof. Atubi, A. O. (Ph.D.)

Department of Geography and Regional Planning
Delta State University, Abraka
Email: atubiprofgrp@gmail.com
Tel: +2348037450078

ACADEMIC BACKGROUND

Atubi, Augustus .O. holds the B.Sc., M.Sc., and Ph.D. degrees in Geography from the University of Nigeria, Nsukka. He is a first class academic scholar and a Professor at the Delta State University, Abraka. Dr. Atubi is a specialist in Urban Transportation Planning, Road Traffic Accident Analysis and Transport Policy Impact Analysis. He is an erudite scholar and researcher of repute. He has wide knowledge of the scientific framework for transportation modeling in inter-city and inter-country transport service provision and networking. He has since been teaching courses both at the Undergraduate and Postgraduate levels of the Department of Geography and Regional Planning, Delta State University, Abraka. Dr. Atubi has contributed on several occasions fundamental issues relating to transport policies and guidelines.

ABSTRACT

This study examined the effects of environmental degradation on human health in nine selected oil communities in Delta State, Nigeria. 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. The data collected were analysed using principal component analysis (PCA). The explained variance for factors 1 and 2 are 4.177656 and 2.822344 respectively while the joint effect of this result from the Eigen value correlation matrix explains 100% which indicates that the isolated factors accounts for 100% of environmental degradation. Based on the findings, recommendations were proffered.

Keywords: *Oil spillage environment health; human; oil producing; Delta State.*

INTRODUCTION

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.

The oil producing communities in Delta state thus is under increasing pressure from rapidly deteriorating ecological and economic conditions, social dislocation and tension in communities which are not being addressed by current policies and behaviour patterns. A recent study of the region by the World Bank (1995) has warned that:

"An urgent need exists to implement mechanism to protect the life and health of the region's inhabitants and its ecological systems from further deterioration".

One of the major problems identified by the people in these areas is the lack of access to health care facilities. At the 1995 stakeholders meeting of the Niger Delta region the participants drew attention to the inability of oil companies to alleviate poverty and the possibility of enhancement of disease as being two critical areas of concern of the people (Onokerhoraye, 1999).

The people hold the view that because oil operations involve the release of hydrocarbons and other noxious materials into the atmosphere, gas combustion with the generation of intense heat and flares and the disposal of industrial wastes, may affect the fertility of the inhabitants in such a manner that fecundity may fall and the birth of abnormal babies may increase. Also cases of cancers, especially those of the skin may rise and respiratory diseases especially chronic restrictive lung conditions may increase. Anxiety was also expressed regarding the related effect of the oil company operations on nutrition, arising from devastation of arable land, and a degeneration of marine and aquatic life from periodic oil pollution of dry land, swamps, rivers and streams. Human health is therefore identified by the communities themselves as a major issue which must be addressed to improve their quality of life.

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 Stele, 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.

Because of this massive oil exploration in the Niger Delta, the ramifications for human health, local culture, indigenous self-determination, and the environment are severe. As is the case in most oil producing regions of less developed countries, the economic and political benefits are given significantly more weight by the government than the resulting damage to the environment and human health (O'Rourke and Connolly, 2003). Oil exploration causes a range of environmental problems. These include: contamination of both surface and ground water by benzene, xylene, toluene, and ethylbenzene; contamination of soil by oil spill and leaks; increased deforestation; as well as the economic loss and environmental degradation stemming from gas flaring, which is the focus of the rest of this paper (O'Rourke and Connolly 2003).

In order to address the problems of gas flaring, it is necessary to understand why the natural gas is being flared. Because oil and natural gas are mixed in every oil deposit, the natural gas called "associated gas" must be removed from oil before refining (Ashton *et al.* 1999). Gas flaring is simply the burning of this associated gas. Gas flaring is currently illegal in most countries of the world, where gas flaring may only occur in certain circumstances such as emergency shutdowns, non-planned maintenance, or disruption to the

processing system (Hyne, 1999). Currently 56.6 million m^3 of associated gas is flared every day in Nigeria (Gerth and Labaton 2004). Nigeria has the world's highest level of gas flaring, and it flares 16 percent of the world's total associated gas (GGFR 2002). Due to a lack of utilized infrastructure, approximately 76 percent of associated gas is flared in Nigeria, compared 8 percent in Alberta, Canada (Africa News Service, 2003; Watts 2001).

The effects on human health are all related to the exposure of those hazardous air pollutants emitted during incomplete combustion of gas flare. These pollutants are associated with a variety of adverse health impacts, including cancer and non-cancer, neurological, reproductive, and development effects (Kindzierski 2000).

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 violet 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 sit e s 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.

STUDY AREA

Delta State is bounded in the North by Edo state, the east by Anambra State, south – east by Bayelsa State, and on the southern flank by the bight of Benin which covers about 160 kilometers of the states coastline (see fig. 1). Delta State is generally low-lying without remarkable hills, and covers a landmass of about 18,050km^2 of which more than 60% is land. The sate has a wide coastal belt inter-laced with rivulets and streams, which form pat of the Niger-Delta.

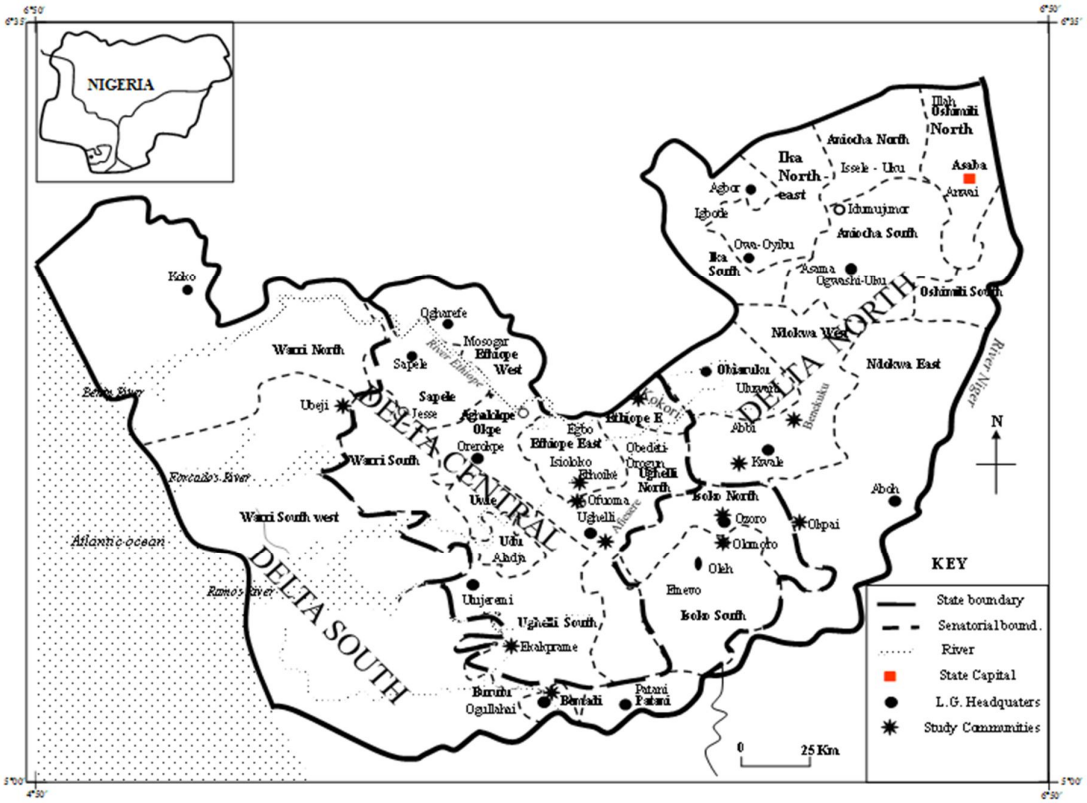

Fig. 1: Map of Delta State showing the selected oil producing communities.

RESEARCH METHODS

The data used for this study was obtained from both primary and secondary sources. The primary data was acquired from field data generated through administration of questionnaires.

Secondary data was from archival records of in-and-out patients 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.

Questionnaires were administered to the household heads of dwellers of oil producing communities and archival data of diseases linked to oil productions such as bronchitis, cough, asthma, cardiovascular diseases, eye infection and skin infection collected from the government owned hospital in the nine (9) communities of Okpai, Kwale, Benekuku, Ubeji, Bomadi, Ekakprame, Erhoike, Afiesere and Uzere for a year. Consistency of data was the guiding factor of the year chosen.

The monthly in-and-out patient diseases case records that are oil production related for one year will be collected from the medical report records of the Government hospitals or clinics located in the nine communities based on record consistency.

The statistical tool employed in this study is the cluster and principal component analysis using 'Statistica' software version 12.0 on windows.

DISCUSSION OF RESULTS/FINDINGS

From Table 1 and fig 2, 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 1: 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

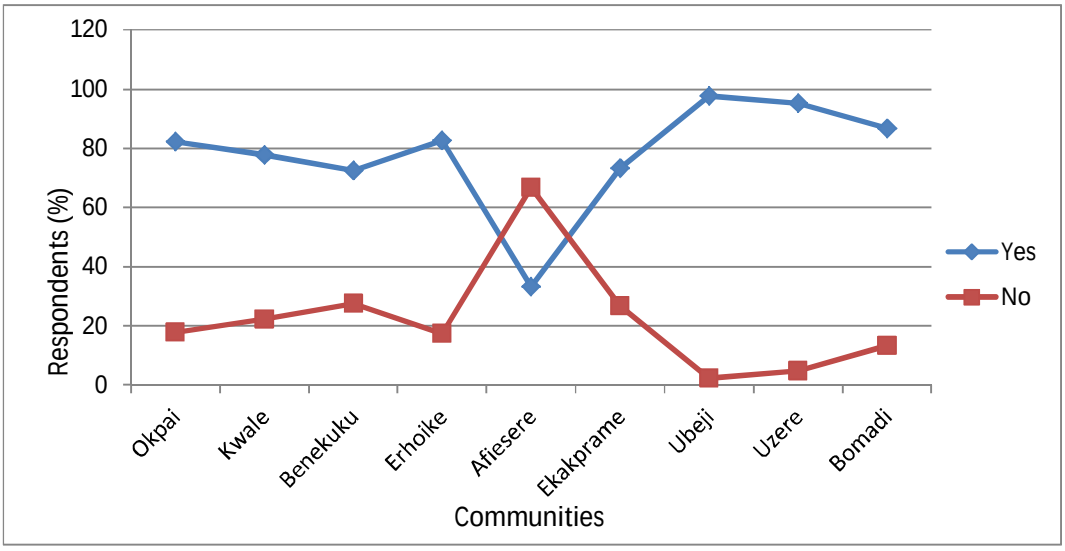

Fig 2: Vulnerability to Environmental Degradation

Table 2 and fig 3 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 2: 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

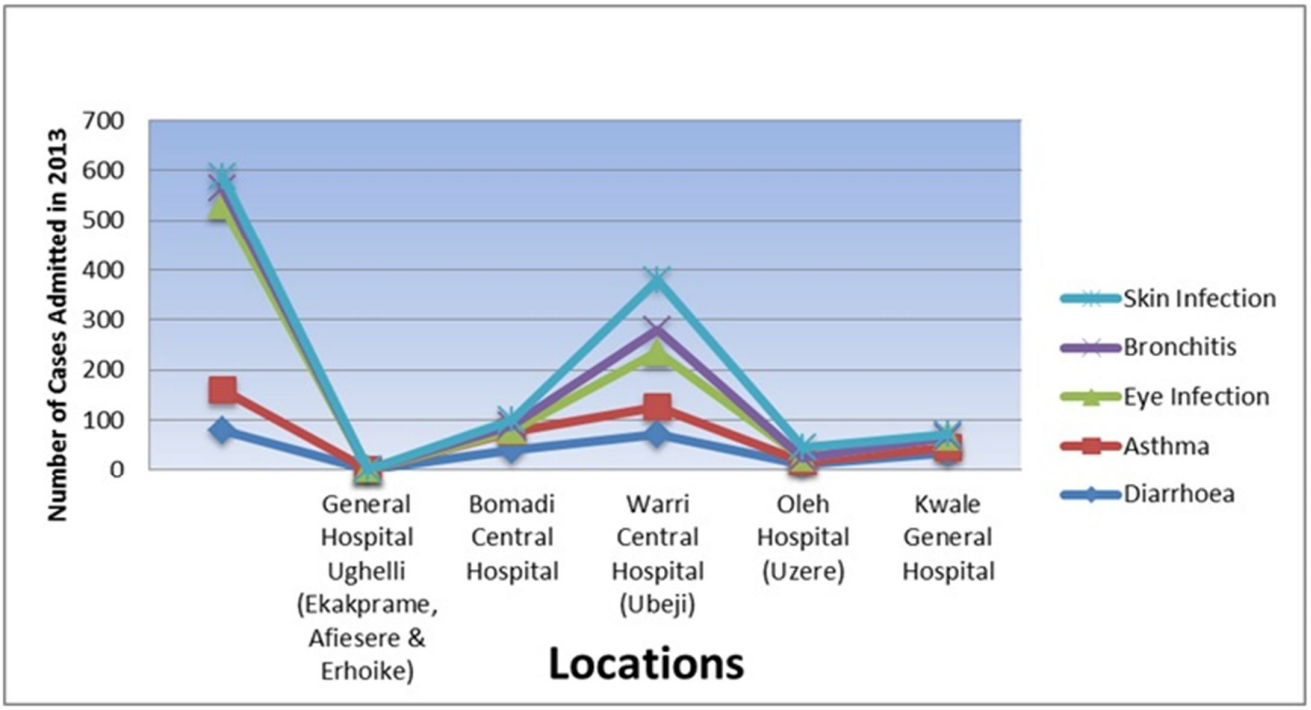

Fig 3: Types of illness and Admission rate

From table 3 and fig 4, 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 diarrhea and eye infection admission is also high in the area (Table 3). 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 3: 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

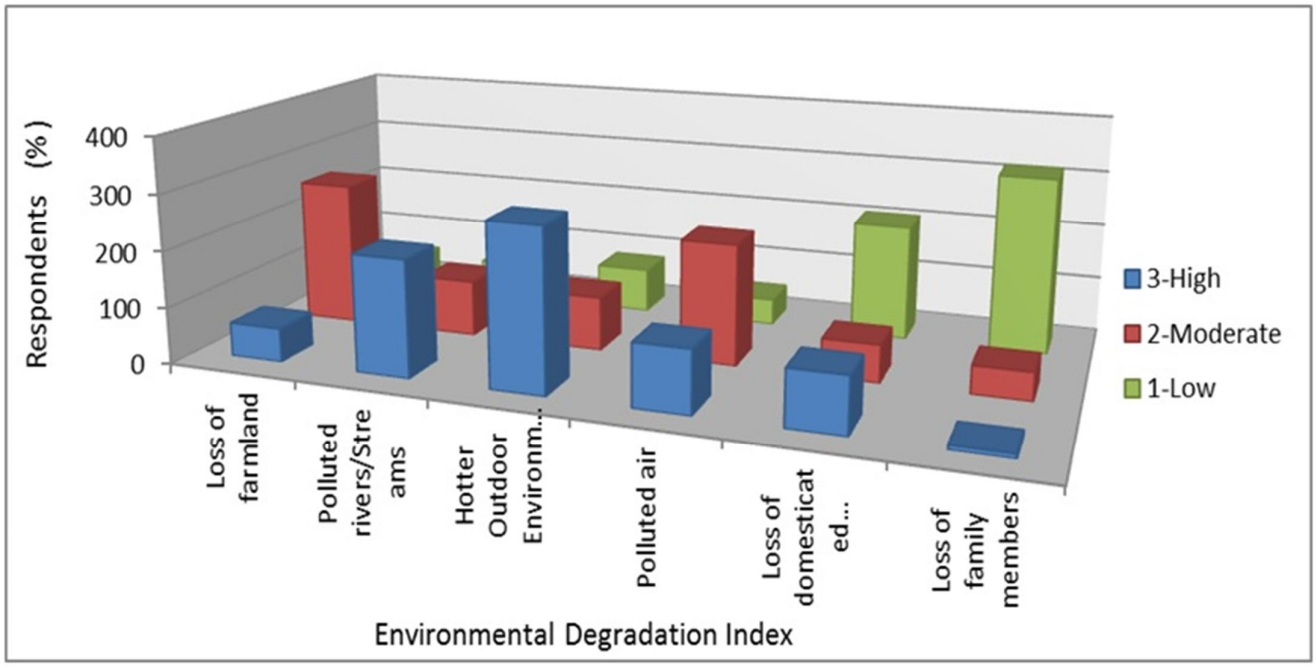

Fig 4: Impact of Environmental Degradation in order of severity

Table 4 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 4 below.

Table 4: 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

From the result of the analysis in fig 5, using non standardized data to test the stated hypothesis, it is revealed that loss of domesticated livestock and loss of family members were outliers and therefore does not have close relationship with oil spillage. However, the result shows that oil spillage has a direct link to loss of farmland and Polluted air (if fire is involved) and these have a relationship with polluted rivers/streams as well as hotter outdoor environment. By this we imply that there is a significant effect on human health related activities from oil spillage.

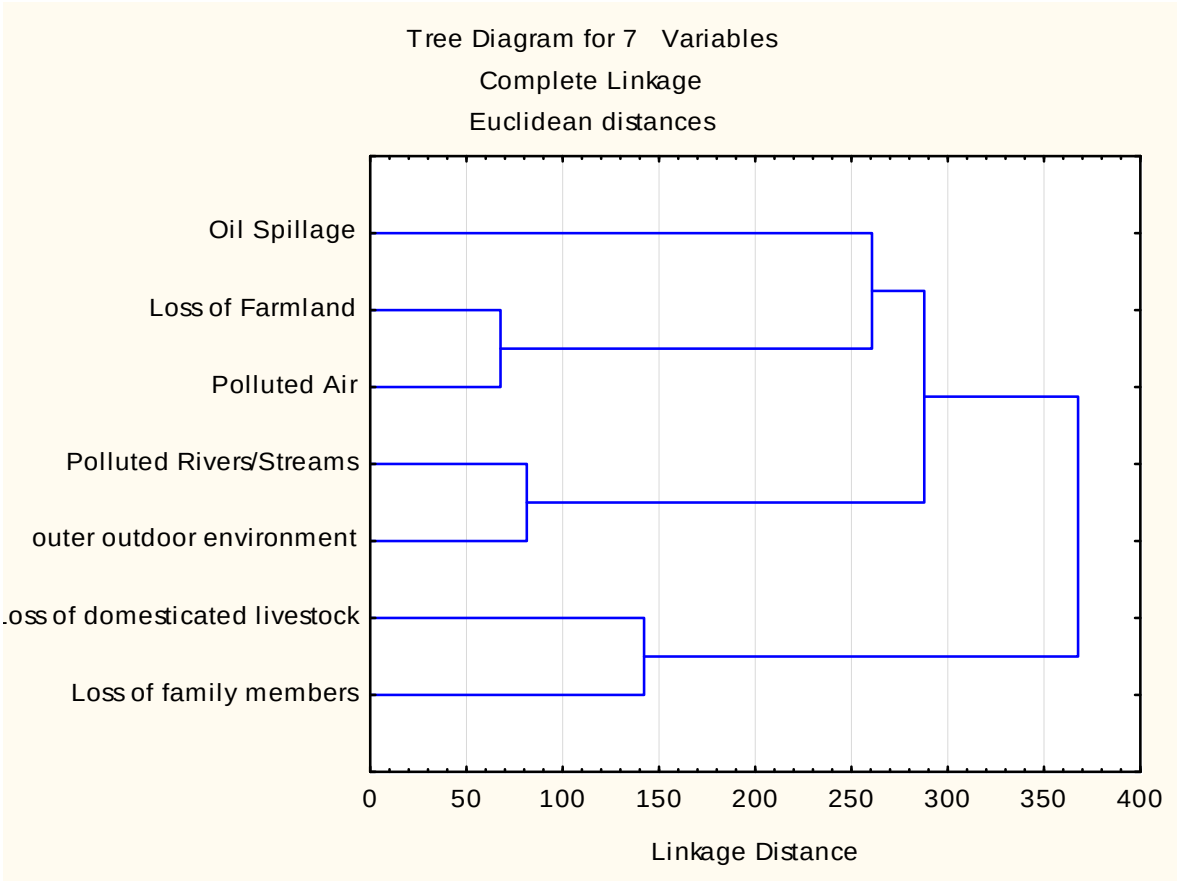

Fig 5: Complete linkage Cluster between oil spillage and human health related activities

The result presented in table 5, Factor 1, show that the variables that oil spillage leads results to in the study area was isolated by PCA from the different signatures of oil spillage. From the table, oil spillage has positive relationship or link with loss of farmland, polluted rivers/streams, hotter outdoor environment, and polluted air. However, there is a negative relationship between loss of domesticated livestock and loss of family members. The explained variance for factors 1 and 2 are 4.177656 and 2.822344 respectively while the joint effect of this result from the Eigen value correlation matrix explains 100% which indicates that the isolated factors accounts for 100% of environmental degradation (table 6 and fig 6)

Table 5: PCA Factor Loadings (Unrotated) (Spreadsheet1) Extraction: Principal components (Marked loadings are >.700000)

	Factor - 1	**Factor - 2**
Oil Spillage	0.860463	0.509512
Loss of Farmland	0.198887	-0.980022
Polluted Rivers/Streams	0.893839	0.448389
hotter outdoor environment	0.808861	0.588001
Polluted Air	0.532452	-0.846460
Loss of domesticated livestock	-0.842455	0.538766
Loss of family members	-0.975328	0.220762
Expl.Var	4.177656	2.822344
Prp.Totl	0.596808	0.403192

The Scree plot helps us to know the Eigen values to retain based on the point of sharp drop of the trend. The sharp drop is around 0.5 values in fig 6, therefore we retain 2 values, 40.32% and 59.68%. These two values accounts for 100% of the explained value of oil spillage effect to human health. No unexplained factor by this model. Therefore, we can conclude, that oil spillage has a significant effect on human health in the selected communities.

Table 6 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 6: Eigenvalues of correlation matrix, and related statistics -Active variables only

	Eigenvalue	% Total - variance	Cumulative - Eigenvalue	Cumulative - %
1	4.178035	59.68622	4.178035	59.6862
2	2.821965	40.31378	7.000000	100.0000

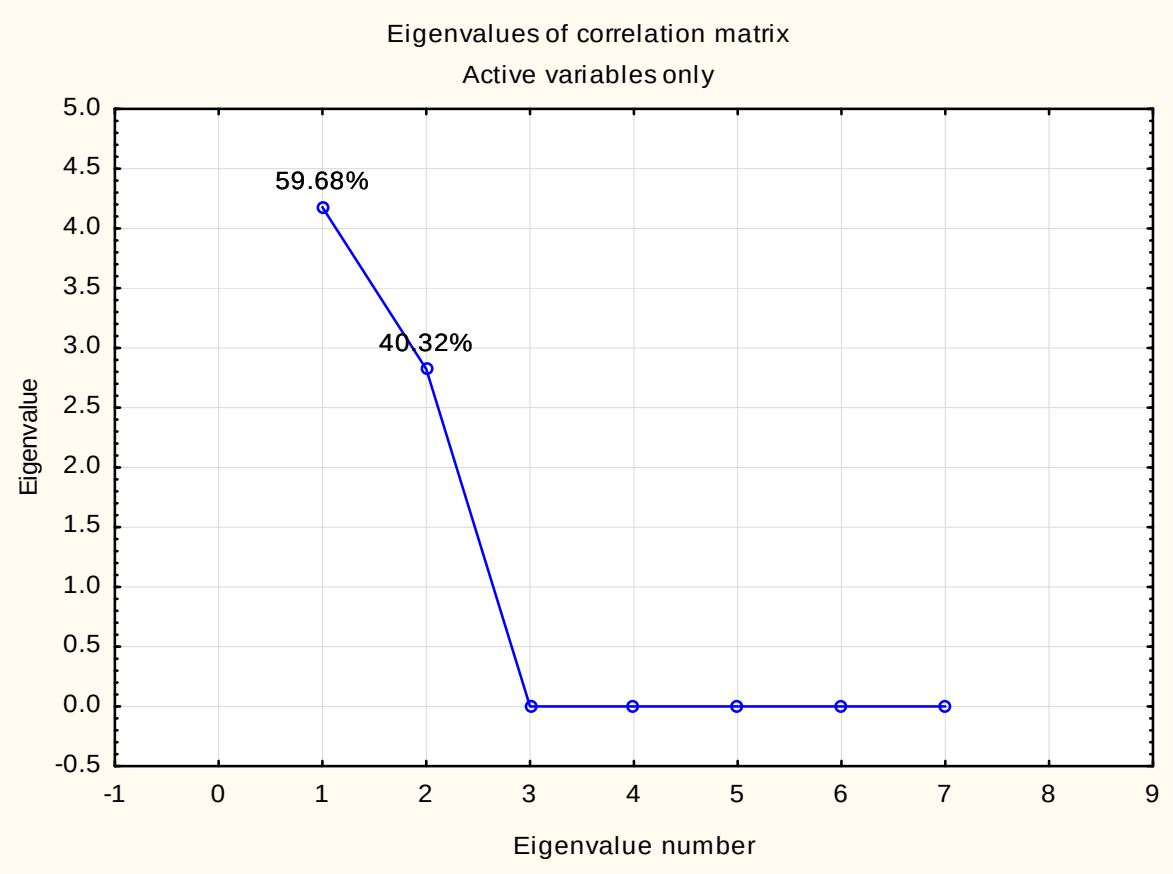

Fig 6: Scree plot of the Eigen values

Table 7 showed that gas flaring has direct link with air pollution and skin infection while the other variables eye infection to bronchitis are also interlinked. However, since two major variables were isolated by the cluster analysis, we therefore proceed to analyse the cumulative Eigen values of those two variables amongst others using the Principal Component Analysis (PCA).

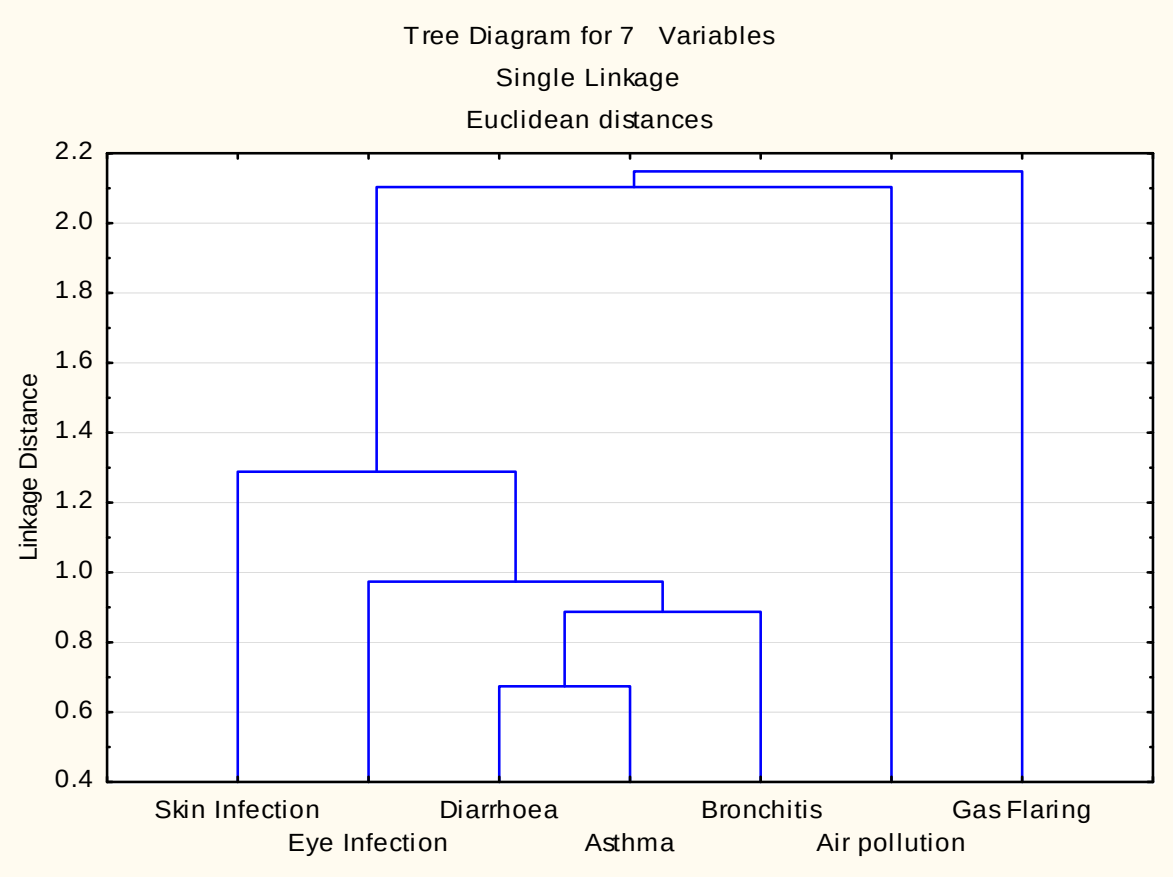

Fig 7: Cluster Analysis of the standardized data showing the linkage between Gas Flaring and human health indices **(Fieldwork Analysis, 2013)**

From the result presented in table 7, PCA actually extracted only two (2) variables with the major health challenge (air pollution and skin infection) linked to gas flaring. The two processes give us two Eigen values which are 3.507493 for factor 1(first process) and 1.699680 for factor 2 (second process) which cumulatively gives an Eigen value of 74.3882 percent (see fig 6 for the Scree plot of the Eigen Values of correlation matrix for the two active variables).

Table 7: Eigenvalues of correlation matrix, and related statistics (Spreadsheet1) Active variables

Eigenvalues of correlation matrix, and related statistics (Spreadsheet1) Active variables only				
	Eigenvalue	**% Total - variance**	**Cumulative - Eigenvalue**	**Cumulative - %**
1	3.507493	50.10704	3.507493	50.1070
2	1.699680	24.28115	5.207173	74.3882
3	1.111689	15.88127	6.318862	90.2695
4	0.681138	9.73054	7.000000	100.0000

The Scree plot helps us to know the Eigen values to retain based on the point of sharp drop of the trend. the sharp drop is around 1.5 value in fig 6, therefore we retain 2 values, 24.28% and 50.11%. These two values accounts for 74.39% of the explained value of gas flaring effect to human health. The other 25.61% is the unexplained factor by this model that has effects on human health. Therefore, we can conclude, that gas flaring has a significant effect on human health.

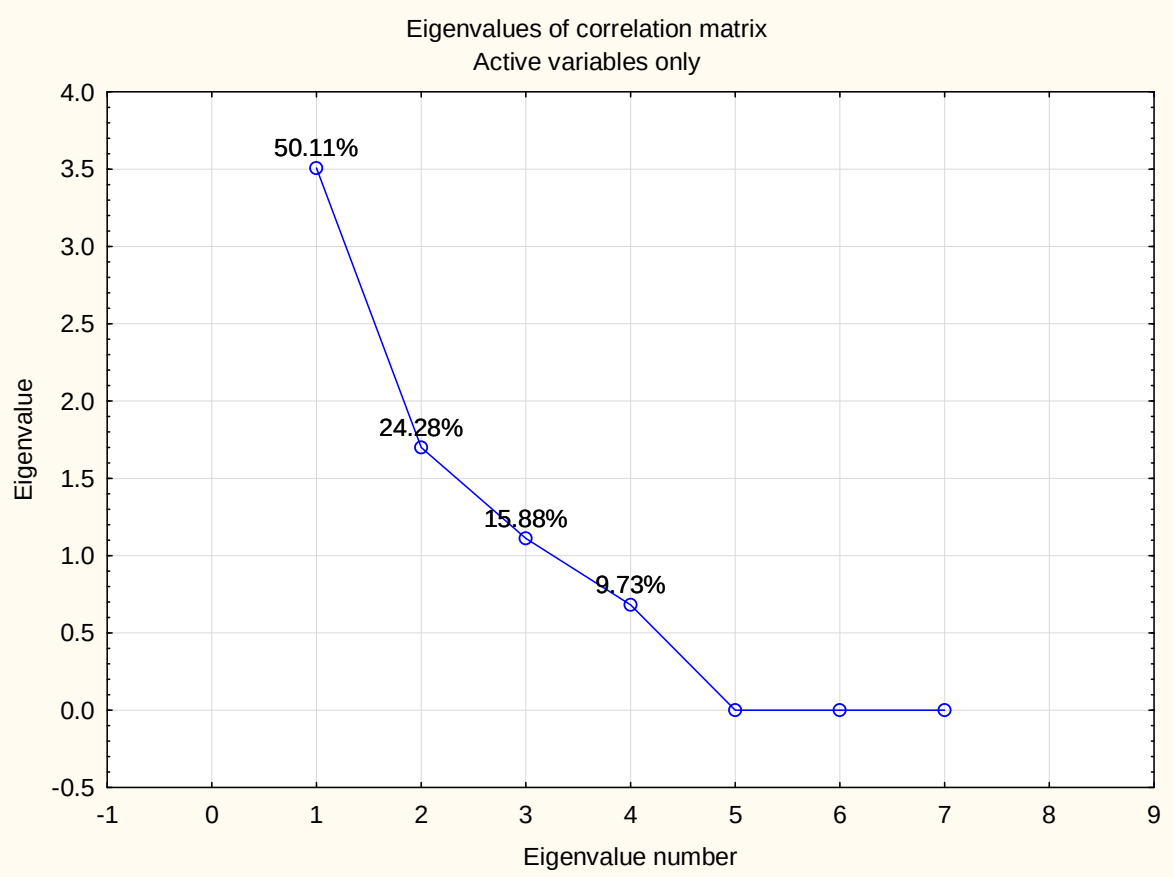

Fig 8: The Scree Plot of Eigen Value of Correlation matrix

POLICY IMPLICATIONS/RECOMMENDATIONS

- The Federal Government policy on zero flare by July, 2008 should be put to place and not a mere policy statement. This could be done by the utilization of the gas being flared through re-injection process during oil production, and construction of gas plants for electricity generation and harness the flared gas for both private and commercial uses.
- There should be appropriate compensation by the multinational oil companies to the bearing communities, also to see to their socio-economic well-being. All the equipment used by the oil companies should be up dated and modernized to international standards. Thus, a technology that will enable complete combustion of the gases is important. This will reduce the production and decomposition of some nitrogen oxides, carbon, sulphur and soot oxides.
- There should be a constant environmental monitoring, assessment and evaluation to determine the level of damage that is done by gas flaring and other oil pollutions on the environment as a whole.
- The companies and government should provide relief assistance to the bearing communities as regards to the provision of basic input such as fertilizers to the various farmers as to enable them to produce enough food crops as their only mainstay of livelihood and compensation should be paid to host communities. The Federal Government should ensure that all decisions relating to environmental quality integrate the need for sustainable development for future generation.
- 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. Strict implementation of oil drilling related laws by the government and appropriate bodies with elimination of corruption and bureaucratic bottleneck is recommended. There should also be a modification in the current regulatory framework of gas flaring and holistic approach to the environment of planning, development and management of land resources.
- Government should in the place of amnesty develop the region as people who are taking out of their environment to acquire skills elsewhere would one day return home to apply what is learnt and if the environment remains degraded will opt for arms again thereby making the efforts put at amnesty to be a white elephant project.

CONCLUSION

This research was undertaken to examine the effects of environmental degradation on human health in nine oil producing communities in Delta State. From the study, it is seen that oil spillage and gas flaring and indeed environmental degradation has 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.

REFERENCES

1. Africa News Service. (2003). Oil companies and gas flaring in Niger delta. October 14, 2003.
2. Akpabio G. T., N. J. George, A. E. Akpan and Obot. I.B. (2010): The implication of oil spillage on the thermal properties of soil samples in the Niger delta, southern Nigeria, *Archives of Applied Science Research*, 2, 3, 267 – 276.
3. Ashton, N.J, Arnott, S. and O. D. (1999). The human ecosystems of the Niger delta - an ERA handbook. Environmental Rights Action, Lagos. 224pp.
4. Babatunde, A. (2010). "The Impact of Oil Exploitation on the Socio-Economic Life of the Ilaje-Ugbo People of Ondo State, Nigeria". *Journal of Sustainable Development in Africa*, Volume 12, No.5. 7-10
5. Black well D. D. and Stele, J. L eds; (1989): Geophysics, part B field measurements: Academic press, Inc, Orlando, *Methods of experimental physics* 24, 189 – 226.
6. Department of Sustainability, Environment, (2002): Water, Population and Communities, Australia's National Strategy for Ecologically Sustainable Development. Available @ http://www.environment.gov.au/
7. Egbe, R.E and Thompson, D. (2010): Environmental Challenges of Oil Spillage for Families in Oil Producing Communities of the Niger Delta Region, *JHER* Vol.13, December, 2010, pp. 24-34
8. Egwu, S.A. (2012): Oil Spill Control and Management, *Petroleum Technology Development Journal Quarterly*, Vol. 19 No. 3, pp. 457- 478
9. George, N. J.; Akpabio, G. T. and Udofia, K.M. (2010): The implication of oil spillage on the thermal properties of soil samples in the Niger delta, southern Nigeria, *Archives of Physics Research, 1 (4): 64-72*
10. Gerth, J. and L. Labaton. (2004): Shell withheld reserves data aid Nigeria. New York Times. March 19,2004.
11. Global Gas Flaring Reduction (2002): A Public Private Partnership. Workbook for small-scale utilization of associated gas. http://www.worldbank.org/ogmc/ggfrsmallscale.htm, accessed Feb 7, 2013.
12. Hyne, J.N. (1999). Dictionary of petroleum exploration, drilling & production. PennWell Pub.Co., Okla. 625pp.
13. Ibaba S. I. (2010). "Environmental Protection Laws and Sustainable Development in the Niger Delta". *Africana*, vol 4 o 2.
14. Kindzierski, W.D.(2000): Importance of human environmental exposure to hazardous air pollutants from gas flares. *Environmental Reviews* 8: 41-62
15. Lawal, M.O and Ese, T.C. (2012). Environmental Impact of Pipeline Vandalization on the Nigerian Landscape: The Case of the Niger Delta Region, *J Hum Ecol*, 39(1): 73-84.
16. O'Rourke, D and S. Connolly (2003). Just oil? the distribution of environmental and social impacts of oil production and consumption, *Reviews in Advance* 28: 05.1-05.31.
17. Ohwofasa, B.O, Anuya, D.E. & Aiyedogbon, J.O. (2012): Environmental Degradation and Oil Industry Activities in the Niger-Delta Region, *African Journal of Scientific Research* Vol. 9, No. 1, pp 444-460.
18. Olokesusi AO (1987): Characteristics of environmental problems in Nigeria and management prospects, *The Environmentalist*, 7(1): 55-60.

19. Omofonmwan, S.I. and Odia, L.O. (2009): Oil Exploitation and Conflict in the Niger-Delta Region of Nigeria, *Kamla-Raj Journal of Human Ecology* 26(1): 25-30.
20. Sagay, J., Edo, Z.O and Avweromre, L. (2011). Environmental Degradation and The Dilemma of Sustainable Development: Implication For Environmental Security in The Niger, *Journal of Environmental Sciences and Resource Management* Vol 3, 14-29.
21. Veitch, C. (2009), Impact of rurality on environmental determinants and hazards. *Australian Journal of Rural Health*, 17: 16–20
22. Watts, M. (2005). Petro-violence: community, extraction, and political ecology of a mythic commodity. Pp. 189-212 In Violent environments. Watts, M. and Peluso, N. eds. Cornell University Press.
23. World Health Organisation (1986).Ottawa Charter for Health Promotion. First International Conference on Health Promotion. Retrieved 10 November, 2012 and available from http://www.who.int/hpr/NPH/docs/ottawa_charter_hp.pdf
24. World Health Organisation (2011). Retrieved November, 2012 and available from http://www.who.int/topics/environmental_health/en/
25. Olokesusi AO (1987): Characteristics of environmental problems in Nigeria and management prospects, *The Environmentalist*, 7(1): 55-60.