

## Oil Activities, the Environment and Health Insecurity Concerns in the Niger Delta

Crosdel O. Emuedo<sup>1</sup> and Okeoghene A. Emuedo<sup>2</sup>

<sup>1</sup>Department of Political Science and Sociology, Western Delta University, Nigeria

<sup>2</sup>Rubber Research Institute of Nigeria, Iyanomo, Nigeria

**\*Corresponding Author:** Crosdel O. Emuedo, Department of Political Science and Sociology, Western Delta University, Nigeria. Email: emuedo@yahoo.com

### ABSTRACT

*The human security paradigm is concerned with issues such as security from environmental despoliation, poverty, livelihoods, conflict and disease, which singly or collectively enhance human insecurity. The Nigerian state in partnership with the oil multinational companies has carried out oil activities in the Niger Delta since 1956. These activities have been carried out with little regard for the environment and the people. As a result, the Niger Delta has been visited with oil-related “ecological warfare”; polluted environment, large scale displacements and acute poverty. The study examines crude oil exploration and exploitation activities in the Niger Delta and how these have impacted on human security in the region. It examines closely the effects of oil activities on health security of the Niger Delta people, deploying both qualitative and quantitative research methodologies for data collection, analysis and presentation. The data for this study were collected using multiple sources (triangulation), which included; structured close-ended questionnaire schedule, focus group discussions and open-ended target interviews. The study concludes that since the 1990s, human security in the Niger Delta has been stymied and often completely eroded*

### INTRODUCTION

Since 1956 the Niger Delta has been Nigeria’s oil production enclave and is now synonymous with oil. The search for oil in Nigeria started in 1937 but was abandoned during the period of the Second World War and later resumed in 1946 (Oil and Gas News, 1965). In 1951, the first exploration well was drilled at Ihuo near Owerri, but in 1956 in Oloibiri, in present day Bayelsa State, the first successful well was drilled (Fagade, 1990). Few people could have guessed what was going to happen when helicopters first landed near St. Michael’s Church in Oloibiri in 1956. A camp was hurriedly built; prefabricated houses, electricity, water and then a new road. Shell-BP (its name then) drilled 17 other wells in the Oloibiri oil field, which yielded over 20 million barrels of crude oil before the wells dried up about 20 years after the first well was drilled (Kashi and Watts, 2008). The Oloibiri discovery led to fervent exploratory activities that resulted in more discoveries. For instance, a giant field was discovered at Bomu in Ogoni land, then at Afam, Ebubu, Ughelli and Kokori between 1956 and 1958. Shell-BP which had acquired 46 oil mining leases covering 15,000 square miles,

swiftly expanded its operations across what is now today the Niger Delta. The feverish search for oil was such that land area of about 20,500 square miles was devoted to oil mining leases (Van Heeswijk, 1970). This is almost the entire land area of the Niger Delta, which is about 25,640 km<sup>2</sup> (Ashton-Jones, 1998). According to (Ifeadi *et al.*, 1987) oil discoveries was so phenomenal that between 1960 and 1985 about 3,525 oil wells were drilled and oil export began in 1958 (Emuedo and Abam, 2015). Oil production rose to 12,000 barrels per day (bpd) by 1959 and 900,000 bpd in 1970. The rise in oil production made Nigeria to join the Organisation of Petroleum Exporting Countries (OPEC), and the creation of a state-owned Nigeria National Petroleum Company to oversee activities of the oil majors in the upstream and downstream of the oil sector.

According to Kashi and Walts (2008), within ten years of oil discovery, several oil facilities were constructed; the Bonny oil terminal in April, 1961, and the Trans-Niger pipeline in 1965. Also, the oil fields at Ughelli (Western Delta) were connected to the Bonny terminal and the “twelve giant” oil fields including the first offshore discovery at Okan near Escravos

commissioned in 1964. As, such, by 1967, 300 miles (4800km) of pipe lines had been laid and one and half million feet of wells drilled and daily oil output rose to 275,000 barrels. Thus, at the time of the 1973 oil boom, Nigeria's oil production was similar to the current (2.4 million barrels) daily production; accounting for over 3.5% of world output (Kashi and Walts, 2008). Since then oil has played pivotal role in Nigeria's economy. Proven oil reserves as at January 2007 were estimated at 36.2 billion barrels (RWI, 2010) but (NNPC, 2009) put the figures at 40 billion barrels. This is expected to last for at least the next 40 years (UEIA, 2005; 2014). According to some experts daily oil production could be increase by between 100,000 and 500,000 barrels. Oil production in the region presently stands at about 2.4 million barrels daily. Most oil exploration and production activities are concentrated in the Niger Delta (De Montclos, 1994; Embassy of Nigeria, 2001). The region presently accounts for over 90% of onshore and about 85% of off-shore oil production. Additionally, the region also hosts massive oil facilities; 6006 oil wells, 250 oil fields (Watts, 2008), 10 export terminals, 275 flow stations, 10 gas plants, 3 refineries and a massive natural gas (LNG) sector (Watts, 2007) and technological and administrative infrastructure of the oil industry (Emuedo *et al.*, 2017). Besides crude oil, the Niger Delta is also well endowed with huge deposits of natural gas. The Niger Delta is said to be richer in gas deposits (OGJ, 2005). The region's gas deposits have been estimated at about 159 trillion cubic feet (Tcf) (NNPC, 2009), 176 trillion cubic feet (Tcf) (Watts, 2008:36) and 182 Tcf (RWI, 2010). Thus, making Nigeria the largest natural gas endowed country in Africa and one of the top ten in the world.

The human security paradigm consists of seven parameters of which health security is one of the key factors. It is a fact well known that oil activities in the Niger Delta have involved massive and unabated oil spillages and huge gas flaring. These have negatively impacted the environment with concomitant negative impacts on health of the people, thus, necessitating the focus of this research.

### THE RESEARCH METHODOLOGY

The research questions were intended to elicit reaction to impacts of oil activities in oil-host communities. They include: patterns of livelihood, impacts of oil activities on health;

Common diseases in oil-host communities; Common sources of oil spills in oil communities; Impacts of gas flares on crop production; Impacts of gas flares on fish stocks; Role of oil companies in instigating conflict; Impacts of oil activities on child health.

The primary data for this study were collected using the method of triangulation; structured close-ended questionnaire schedule, focus group discussions and open-ended target interviews. The secondary data sources include; newspapers, magazines, reports and documents. While the primary data were obtained from a sample survey, three in-depth target interview schedules (ITI), comprising of youths, opinion leaders and traditional leaders and three focus group discussion sessions (FGD). The sample sizes were; sample interviewee (SI) 150 (Bayelsa 29, Delta 71 and Rivers 50), in-depth target interviewees (ITI) 30 (10 youths (Y), 10 opinion leaders (OL) and 10 traditional leaders (TL). The size of the focus group discussants (FGD) was made-up of 8 persons each. All the research interviews and discussion sessions took place between February and September 2008. The focus group discussions investigated the knowledge, attitudes and operational ethics of the oil companies and consequence of intra-communal conflicts. The research was conducted in Nembe, Bayelsa state, Afiesere, Delta state and Okrika, Rivers state. In addition, some experts (scholars, scientists and engineers) knowledgeable in the oil industry in the Niger Delta were also interviewed.

The ages of the 150 survey respondents are quite varied and were categorised into five sets and the distribution of their ages are: - 30-39 (12, 8%); 40-49 (18, 12%); 50-59 (24, 16%); 60-69 (39, 26%); 70-79 (57, 38%) respectively. It was also composed of males 123 (82%) and females 27 (18%). The 24 target interviewees (TI) are categorised into three age sets, distributed as follows: - 40-49 (8, 33%); 50-59 (13, 54%); 60-69 (3, 13%) and made up of males 19 (79.17%) and females 5 (20.83%).

### FALL OUT OF OIL ACTIVITIES IN THE NIGER DELTA

Since the advent of oil in the Niger Delta, oil operations have been carried out with impunity; the environment and the peoples' health have been of scant regard for the oil companies. Hence, oil activities have involved huge gas flaring, massive unabated oil spillages and indiscriminate laying of pipelines in the region. Based on per tonne of oil produced, Nigeria

## Oil Activities, the Environment and Health Insecurity Concerns in the Niger Delta

flares the most gas in the world (Cedigaz, 2000; CBN, 2004) as most gas produced is flared (Ibhade, 2001). Nigeria flares the second largest amount of natural gas in the world (after Russia) and accounts for 19.79% of the total amount flared globally (USEIA, 2014). For instance, gas flares averaged 97% from 1970-1979, 97% from 1980 - 1989, 95% from 1990 - 1999 and 51% from 2000 - 2004. Thus, gas flares in Nigeria averaged 76% from 1970 - 2004; approximately, 70 million/m<sup>3</sup> of gas is flared daily into the environment. According to Gerth and Labaton (2004), an estimated 56.6 million cubic metres of gas is flared daily in the Niger Delta, which is about 17.2 billion cubic metres of gas annually. This is equivalent to 40% of African gas consumption and the single largest source of worldwide greenhouse gas emissions (Wikipedia 2007, Moffat and Linden, 1995). Relevant data showed that a total of 917.17 bcm of gas was flared for 51-year period, an average gas flare of 17.98 bcm annually and 49.27 bcm daily. This high level of gas flaring in the Niger-Delta has for long generated concern among scholars (Enehoro, 1973; Aggrey 1983; Obadina, 2000; Oghifo, 2001, Emuedo, 2010). This is because the flares generate enormous

heat around flare sites; often, temperatures are as high as 1,600oC (Ogbuigwe, 1998). Temperature of about 400oC was recorded at an average distance of 43.8 metres from flare sites in Isoko, Delta State (Alakpodia, 1989, 1995). Though flaring has been reduced to about 21% (or about 18 billion cubic meters in 2013) of the gas production, most (86%) of the gas produced by marginal field operators and sole risks/independent operators is still flared (Adewale and Mustapha, 2015). There are 134 gas flaring point in Nigeria, with 131 in the Niger Delta. They are distributed as follows; Bayelsa 46, Delta 43, Rivers 42, Edo 1, while the remaining 2 are located off-shore in Akwa-Ibom State. Most of these flares sites are located proximate to communities. Tables 1 and 2 shows quantity of gas flared at different sites in Delta State and volume of gas produced utilised and flared in Nigeria from 1980 – 2011. These flares have impacted negatively on vegetation growth, animal life and ecological equilibrium in the region as gas flares impact the micro-climate and vegetation (Odilison 1999, Efe 2003) soil, air and water quality (Ekanem 2001), human health (Obajimi, 1998; Oniero and Aboribo 2001).

**Table1.** Gas flaring in Delta State Oil Producing Areas

S/No	Gas Field	Production (mscf)	Qty 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	Owhe	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

## Oil Activities, the Environment and Health Insecurity Concerns in the Niger Delta

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.

**Table2.** Volume of gas produced, utilisation and flared in Nigeria (from 1980 – 2011)

Year	Production (Mm <sup>3</sup> )	Utilised (Mm <sup>3</sup> )	Flared (Mm <sup>3</sup> )
1980	24551.0	1647.0	22904.0
1981	17113.0	2951.0	14162.0
1982	15382.0	3442.0	11940.0
1983	15192.0	3244.0	11948.0
1984	16255.0	3438.0	12817.0
1985	18569.0	3723.0	14846.0
1986	18739.0	1822.0	13917.0
1987	17085.0	4794.0	12291.0
1988	20253.0	5516.0	14737.0
1989	25053.0	6323.0	18730.0
1990	28163.0	6343.0	21820.0
1991	31588.0	7000.0	24588.0
1992	32464.0	7058.0	25406.0
1993	33444.6	7536.2	25908.4
1994	32793.0	6577.0	26216.0
1995	32980.0	6910.0	26070.0
1996	36970.0	10150.0	26820.0
1997	36754.8	10207.0	26547.8
1998	36036.6	10886.5	25150.1
1999	35856.4	12664.6	23191.8
2000	47537.0	21945.0	25592.0
2001	57530.0	29639.7	27890.3
2002	101976.1	26203.4	75772.7
2003	53379.0	30583.0	22796.0
2004	69748.0	45156.0	24592.0
2005	58247.0	34818.0	23429.0
2006	57753.7	39374.8	18376.9
2007	65936.5	43188.4	22748.1
2008	66640.8	48796.0	17844.8
2009	41534.2	28076.5	13457.2
2010	58006.0	44506.6	13499.3
2011	55099.1	38898.2	16200.5

Source: NNPC, DPR and CBN Estimates, 2011.

In addition to the preponderance of gas flares, are massive incessant oil spills. In 2006, crude oil production averaged 2.45 million barrels per day (bpd), with efforts geared at increasing oil reserves from 32 to 40 billion barrels by 2010 (Watts, 2008). But conflicts in the region, disrupted oil activities that reduced oil production to 1.0 million bpd in 2008. The Nigerian State declared a total number of 6,817 oil spills between 1976 and 2001 (O'Neill, 2007). It is impossible to see an oil community environment free from oil spills in the region.

Some oil communities that have suffered huge oil spills and the records of oil spills from 1976 to 2005 in the Niger Delta are shown in Tables 3 and 4 respectively. However, what must be noted here is that the figures recorded are not quite accurate because the oil companies operating in the Niger Delta often underestimate the quantity of oil spills, while a large number of others are unreported; the total volume of oil spilled may be over 10 times higher than the official figures (Moffat and Olof, 1995).

**Table3.** Some Recorded Oil Spills in Oil-Host Communities in Delta State

S/No.	Location of Spill	Cause of Spill	Qty Spilled (bbl)	Ranking
1	Utorogu- Otu-jeremi	Sabotage	25	7
2	Tunu Well	Eqf & Sab	6	18

## Oil Activities, the Environment and Health Insecurity Concerns in the Niger Delta

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 @ Ugbomro	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 Ewreni 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

**Table4.** Records of Oil Spills in Nigeria, 1976 – 2005

Year	No of Spills	Qty Spilled (Barrels)	Qty recovered (Barrels)	Year	No of Spills	Qty Spilled (Barrels)	Qty recovered (Barrels)
1976	128	26,157.00	7,135.00	1991	201	106,827.98	2,785.96
1977	104	32,879.00	1,703.01	1992	378	51,187.96	1,476.70
1978	154	489,294.00	391,445.00	1993	428	9,752.22	2,937.08
1979	157	694,170.00	63,481.20	1994	515	30,282.67	2,335.93
1980	241	600,511.00	42,416.83	1995	417	63,677.17	3,110.02
1981	238	42,722.00	5,470.20	1996	430	46,353.12	1,183.02
1982	252	42,841.00	2,171.40	1997	339	81,727.85	
1983	173	48,351.30	6,355.90	1998	399	99,885.35	
1984	151	40,209.00	1,644.80	1999	225	16,903.96	
1985	187	11,876.60	1,719.30	2000	637	84,071.91	
1986	155	12,905.00	552	2001	412	120,976.16	
1987	129	31,866.00	6,109.00	2002	446	241,617.55	
1988	208	9,172.00	1,955.00	2003	609	35,284.43	
1989	195	7,628.16	2,153.00	2004	543	17,104.00	
1990	160	14,940.82	2,092.55	2005	496	10,734.59	
				Total	9,107	3,121,909.80	550,232.90

**Source:** Emuedo (2010)



## Oil Activities, the Environment and Health Insecurity Concerns in the Niger Delta

These have been exacerbated further, by indiscriminate laying of oil pipelines. Presently, the Niger Delta is criss-crossed by over 7, 000 kilometres of ill-maintained pipelines. These pipes that have become rusted and leaky, often, pour huge volumes of crude into the environment. However, the oil companies to avoid responsibility blame such leaks or bursts on the people. The State has always sided with the oil companies. According to McCaskill (2013), the Nigerian State has usually sided with the oil companies due to the criticality of oil revenues to the economy. Oil pipelines are laid mostly on, or, just below the surface, around communities and people's homes. Also, their laying is devoid of environmental impact

assessments to avoid impairing the environment; contrary to what obtains in other climes. For instance, Greenpeace (1994) reported that "Shell commissioned 17 distinct environmental surveys for its pipeline from Stanlow in Cheshire to Moss Moran in Scotland, before a single turf was cut. A detailed Environmental Assessment Impact covered every measure of the (pipeline) route. Furthermore, "elaborate measures were taken to avoid lasting disfiguring as the route was diverted in several places to accommodate environmental concerns". In Nigeria, no consideration is given to environmental factors, while laying oil pipelines, which has led to myriads of avoidable fire disasters (Table 5).

**Table 5.** Some Major Oil Pipeline Fire Disasters in Nigeria, 1998 - 2006

Date	Place	State	Casualties	Impacts
17/10/98	Jesse	Delta	Over 1300	Pollution, damage to farm lands, over 400 people seriously injured
22/04/99	Bayana	Delta	10	Water and air pollution, damage to farm lands
08/06/99	Akute Odo	Ogun	15	Land and air pollution, damage to farmlands
13/10/99	Ekakpamre	Delta	12	Environmental pollution, damage to farm lands, flora and fauna
14/01/00	Gana	Delta	12	Environmental pollution, damage to farm lands
07/02/00	Ogwe	Abia	15	Environmental pollution, damage to farm lands
20/02/00	Lagos	Lagos	3	Environmental pollution, damage to canoes
14/04/00	Umugbede	Abia	50	Environmental pollution, damage to farm lands
22/04/00	UzoUwani	Enugu	6	Environmental pollution, damage to farmlands
03/06/00	Adeje	Delta	Unknown	Destruction of forest, high tension power cable of 2 electricity plants, youth/ police clash
20/06/00	Okuedjeba	Delta	Unknown	Environmental pollution, damage to farm lands
10/07/00	Adeje-Okpe	Delta	150	Environmental pollution, damage to farm lands
10/07/00	Oviri Court	Delta	300	Environmental pollution, damage to farm lands, injuries to scores of people
05/11/01	Umudike	Imo	3	Several bicycles burnt, about 17 persons injured
19/06/03	Onitcha Umiyi	Abia	125	Damage to farm lands, dozens of people injured
06/01/04	Elikpokwodu	Rivers	Unknown	Damage to over 200 ha of farm lands and properties worth millions of naira
30/07/04	Aghani	Enugu	7	Environmental pollution, injuries to many people
16/04/04	Ijegu	Lagos	60	Air and water pollution
14/12/04	Imore	Lagos	500	Environmental pollution
20/05/05	Akinfo	Oyo	1	34 persons injure, 15 of which died 11 days after
13/01/06	Iyeke	Edo	7	Damage to farm lands, injuries to 6 persons
12/05/06	Ilado	Lagos	150	Anything within 20 metre of scene burnt, scores of people injured, water pollution
02/12/06	Ijedodo	Lagos	1	Environmental pollution, damage to farm lands
26/12/06	Abule Egba	Lagos	500	40 vehicles, 2 churches, a Mosque, scores of homes, businesses; grocery shops, workshops, timber shops, sawmill, burnt

**Source:** *Emuedo (2010)*

Information obtained from an expert during the field work shows that impact of oil related activities on the environment in the Niger Delta may be divided into two broad categories: (1) Impact on the natural environment; biological and living resources, but excluding man made

components; (2) Impact on the socio-economic environment, man and manmade components. Considered together, the impacts of oil activities on the environment in Niger Delta have been very colossal. The focus here however, is on the fall out of oil activities; gas flaring, oil spillages

and pipelines and their impacts, which are examined below.

**GAS FLARING AND HEALTH INSECURITY NEXUS**

The World Health Organisation (WHO) defines health as a state of complete physical, mental and social well being and not the mere absence of disease or infirmity (WHO, 1948). This definition gives a holistic dimension to the issues concerning an individual’s or a whole community’s health (Jekel *et al.*, 2007), and provides a template for defining various dimensions to health and its determinants. The environment includes both living and non-living components and it is recognised as a vital factor in the attainment of good or ill health. The quality of the environment as Roche (2003) opines affects man, controls his actions while man’s actions and inactions influence his environment.

The environment affects our health in a variety of ways. The interaction between human health and the environment has been extensively studied and environmental risks have been proven to significantly impact human health, either directly by exposing people to harmful agents, or indirectly, by disrupting life-sustaining ecosystems (WHO 2009). Studies worldwide shows that living near oil spills and oil production sites is an environmental stressor with adverse effects on health, well-being, and quality of life (Luginaah *et al.*, 2000; Luginaah *et al.*, 2002; Akinbobola, and Njor, 2014; Kponee *et al.*, 2015; Shultz *et al.*, 2015). One environmental stressor is gas flaring that is ubiquitous and carried out in close proximity to communities in the Niger Delta. At temperatures of about 1,300°C to 1,400°C, the gas flares produce a cocktail of toxins CO<sub>2</sub>, VOC, CO, NO<sub>x</sub> and particulates around the clock (Ake, 1996). The flares emit over 41% of carbon dioxide (CO<sub>2</sub>) in Nigeria (Hicks, 1998; Anozie *et al.*, 2007) and causes huge air pollution in the region (Marland *et al.*, 2007). Most of the target interview respondents and focus group discussions participants, viewed gas flares as potentially harmful to their health. Similar view was expressed by about 80% of the survey respondents (Table 6). The noise, odour, heat, continuous night lighting, and black soot combined have caused morbid fear of the impact gas flares on health (Orimoogunje *et al.*, 2010; Ovuakporaye *et al.* 2012)

**Table6.** *Impacts of Gas Flares on Health in Oil-host Communities*

Parameters	Frequency	% Distribution
Most opinion	120	80
Minor opinion	3	2
Neutral opinion	12	8
No opinion	15	10
Total	150	100

*Field survey*

According to WHO (2002), gas flaring accounts for about 2.5 million deaths yearly, representing 4-5% of the 50-60 million global deaths yearly. Exposure to air pollution has been closely linked to several acute and chronic adverse respiratory health problems in asthmatic (Aekplakorn *et al.*, 2003) and non-asthmatic (Kim *et al.*, 2005) children, but Aekplakorn *et al.* (2003) reported that asthmatic children are more prone to adverse health effects of air pollution. Several studies have also linked air pollution to higher incidence of asthma especially among active children (Castillejos *et al.*, 1992, 1995; Romieu *et al.*, 1997; Leonardi *et al.*, 2000; Ostro *et al.*, 2001; Stvendesen *et al.*, 2007; Gent *et al.*, 2003; Shima *et al.*, 2002; Ovuakporaye, *et al.*, 2012). Also, studies have reported an inverse relationship between exposure to air pollution and lung function in asthmatic (Peled *et al.*, 2005) and non-asthmatic (Kim *et al.*, 2005) children. Furthermore, air pollution has been linked to increase in respiratory problems among non-asthmatic children (Stroscher, 1996; Lin *et al.*, 1999; Leahey *et al.*, 2001; USEPA, 2003; Ishishone, 2004; Piller *et al.* 2007). Air pollution impairs lung function in children (Gauderman *et al.*, 2002,2004; Ihorst *et al.*, 2004), which causes high mortality in children (Ha *et al.*, 2003) especially those younger than five years of age (Conceicao *et al.*, 2001; Glinianaia *et al.*, 2004).

The Niger Delta appears not different, as, the survey result showed chest pain topped the distribution of common ailments in oil-host communities (Table 7). This is in tandem with results of the above studies.

**Table7.** *Common Ailments in Oil-host Communities*

Parameters	Frequency	% Distribution
Malaria	29	19
Chest pain	56	37
Rashes	22	15
Dysentery	19	13
Diarrhoea	18	12
None of these	6	4
Total	150	100

*Field survey*

## Oil Activities, the Environment and Health Insecurity Concerns in the Niger Delta

The survey result appears supported by hospital records from oil host communities in the region (Table 8) that shows high incidence of respiratory problems. A total of 235 Diarrhoea cases, 187 Asthma cases, 511 cases of eye infection, 90 cases of Bronchitis and 157 cases of skin infection were reported at hospitals in

the area in 2013 alone. The high incidence of such diseases may be linked to air, water and land pollution in oil-host communities. For instance, Ovuakporaye, *et al.* (2012) a study reported reduced lung functions among people living in gas flares areas compared to those from areas without gas flares.

**Table 8.** Hospital Recorded Illness Associated with Oil-Host Communities in Delta State

Name of Hospital	Type of Illness Reported				
	Diarrhoea	Asthma	Eye Infection	Bronchitis	Skin Infection
General Hospital Ughelli	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	47.00	37.40	102.20	18.00	31.40

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

Myriads other studies have shown that exposure to air pollution adversely impacts lung function resulting in respiratory symptoms (Castillejos *et al.*, 1992, 1995; Romieu *et al.*, 1997; Leonardi *et al.*, 2000; Stvensen *et al.*, 2007; Gauderman *et al.*, 2007). The World Bank, also asserted that based on conservative estimates, adverse effect of particulates from gas flaring results in 49

premature deaths, 4,960 respiratory illnesses among children and 120 asthma attacks annually in Bayelsa State (World Bank 1995). The link between diseases incidence and oil pollution is further buttressed by the occurrence of certain diseases in Rivers State from 2003 - 2007 (Table 9).

**Table 9.** Total Number of Occurrence Yearly for Certain Diseases in Rivers State, Niger Delta.

Year	Measles	Pulmonary tuberculosis	CSM	Pertusis	Pneumonia	Total
2003	712	656	12	289	3470	5139
2004	1433	983	19	81	4760	7276
2005	620	897	17	43	4309	5886
2006	514	677	4	1	4189	5385
2007	167	757	2	13	5810	6749
Total	3443	3970	54	427	22538	30435

**Source:** Nwachukwu *et al.* (2012)

### OIL POLLUTION AND HEALTH INSECURITY NEXUS

As already mentioned, the highest volume of gas flared in the world is in the Niger Delta. This has been further exacerbated by oil spillages into the environment in the region. The negative effects of oil spills on the Niger Delta environment have been the focus of several researches (Awobanjo, 1981; Idoniboye and Andy, 1985:311-314; Ikein, 1990:131; Taiwo and Aina, 1991:55-58; Oyebadejo and Ugbaja, 1995:12-15; World Bank, 1995; Moffat and Linden, 1995; Grevy, 1995; Olomo and Omene, 1995; NDES, 1997; Famuyiwa, 1998; Chukwu *et al.*, 1998; Manby, 1999:56-90; Ikporukpo, 1999:15; Esparza and Wilson, 1999:8; Frynas, 2000:158-162; Onosode, 2003; Essoka *et al.*, 2006; Achudume, 2009; Emuedo, 2010; Emuedo *et al.*, 2012; Emuedo and Emuedo,

2014; Emuedo and Emuedo, 2018). Unabated oil spillages have led to massive pollution of most lands and surface and ground water in the Niger Delta (Tables 2 and 3). Oil in water changes the quality of water (Alrumman *et al.*, 2016), impairing both the environment and human health (Briggs, 2003). Water is an important natural resource used for drinking and other developmental purposes (Bibi *et al.*, 2016). Safe drinking water is necessary for human health all over the world. Being a universal solvent, water is a major source of infection. According to world health organisation (WHO) 80% diseases are water borne. Drinking water in various countries does not meet WHO standards (Khan *et al.*, 2013). 3.1% deaths occur due to the unhygienic and poor quality of water (Pawari and Gawande, 2015). This may explain why most participants



## Oil Activities, the Environment and Health Insecurity Concerns in the Niger Delta

in the various focus group discussions and response from target interviewees decried the pervasive incidents of oil spills in the Niger Delta. These views were also reinforced by data obtained from the sample survey as 132 (88%) respondents opined that oil spill had occurred in their communities (Table 10).

**Table 10.** Incidence of oil Spills in Niger Delta Oil-host Communities

Parameters	Frequency	% Distribution
Most opinion	132	88
No opinion	4	3
Minor opinion	6	4
Neutral opinion	8	5
Total	150	100

### Field survey

The unabated oil spillages has resulted in acute pollution of the environment (Boyden, 1974; Schultz-Baldes, 1974; Philips, 1976a,b) Egborge, 1991; Ezemonye, 1992; Agada, 1994) leading to very high concentration of heavy metals; nickel, lead, copper, chromium, iron, cobalt, cadmium and mercury in the tissues of flora and fauna in the Niger Delta (Otuya *et al.*, 2008; Gideon-Ogero, 2008). Studies of oil spills worldwide have also reported major physiological health effects of exposure to oil pollution; asthmatic attacks, headache, diarrhoea, dizziness, abdominal pain, back pain, among other symptoms (Lyons *et al.*, 1999; Goldstein *et al.*, 2011; Gill *et al.*, 2012;

D'Andrea, 2013). These effects often co-occur with emotional distress even where the people are not directly exposed to the oil (Downs *et al.*, 1993). Nriagu *et al.* (2016) found high prevalence rates for symptoms that have been associated with oil spills in other parts of the world in the Niger Delta; headache (96%), watery eyes (81%), sore throat (80%), respiratory problems (64%–83%), itchy skin (84%), rashes on face and neck (78%), sneezing, coughing or congested nose without a cold (83%), nausea (70%), dizziness (79%), chest pain (80%) and diarrhoea 74%.

Environmental pollutants have various adverse health effects from early life. Some of the most harmful effects include; infant mortality, respiratory disorders, allergy, malignancies, cardiovascular disorders, mental disorders, and various other harmful effects (Kelishadi *et al.*, 2009; Kelishadi and Poursafa, 2010). Thus, acute pollution of the environment from oil spillages have seriously impacted the health of the people, with young children especially more vulnerable. According to Ransome-Kuti *et al.*, (1992), children under the age of 5-years that constitute only 20% of the total population, account for 50% of the deaths in the region. Relevant data also show that more children die in the region than in other zones of the country Table 11, with males accounting for a larger number of the dead (Table 12).

**Table 11.** Child and Infant Mortality Rates by Geopolitical Zones in Nigeria 2006

Re	Neonatal mortality	Post-neonatal mortality	Infant mortality	Child mortality	Under-five mortality
National	53	56	109	121	217
North-Central	53	49	103	70	165
North-East	61	65	125	154	160
North-West	55	59	114	176	209
South-East	34	32	66	40	103
South-South	63	78	130	163	203
South-West	39	30	69	47	113

**Source:** Adapted by author from data obtained from Niger Delta Human Development Report, UNDP (2006).

**Table 12.** Children Death Distribution by Age and Sex in Delta State 2007

Male					Female					
Under 1yr	1-5yrs	6-14yrs	15+	Total	Under 1yr	1-5yrs	6-14yrs	15+	Total	Grand Total
60(13.33)	88(19.56)	50(11.11)	61(13.56)	259(57.56)	48(10.67)	69(15.33)	37(8.22)	37(8.22)	191(42.44)	450

**Source:** Adapted by author from Niger Delta Human Development Report, UNDP, 2006

## OIL PIPELINES AND HEALTH IN THE NIGER DELTA

Aside from gas flares and oil pollution the over 7,000 kilometres of pipelines criss-crossing almost

the entire Niger Delta landscape constitute another source of ill health or sudden death to the people. The ill-maintained pipelines constitute the main source of most oil spills in the Niger Delta. Arguably, it could rightly be said that the

## Oil Activities, the Environment and Health Insecurity Concerns in the Niger Delta

construction of oil pipelines aptly manifest the impunity of operations of the oil companies in the oil region. The oil companies in their extraction of the region's petro-dollars have entirely ignored environmental *safety*. Pipelines are laid in the region without regard to standard and best practices, nor regard given to sustainability of the environment and its resources by the oil companies (Wunder, 2003). As such, most of the pipelines are laid on the surface, just beneath the surface and in some cases four feet above ground level, thus, exposing them directly to the vagaries of the weather. In parts of the Niger Delta, pipelines pass in front of dwelling houses or some in instances actually divide communities into two. The reason for this is that while the oil companies always ensure best practices in their home countries, they take no such precautions in Nigeria. For example, Shell during the construction of its pipeline from Stanlow in Cheshire to Moss Moran in Scotland,

commissioned 17 different environmental surveys before a single turf was cut, while detailed environmental impact assessment covered every length of the (pipeline) route. In addition, elaborate measures were taken to avoid lasting disfiguring as the route was diverted in several places to accommodate environmental concerns (Greenpeace, 1994). However, the same precautions are not taken in the Niger Delta; mostly, environmental impact assessments are ignored. Sometimes, as a veneer the oil companies merely give such jobs to academic contractors willing to do their bidding for monetary benefits. Besides, most of the pipelines that were laid in the 1960s and 1970s remained unchanged and are ill maintained. These aged and ill maintained pipelines have caused series of oil fires that have brought avoidable deaths to thousands of peasants across the Niger Delta and some other parts of the country (Table 13).

**Table 13.** Some Prominent Oil Pipeline Fire Disasters in Nigeria, 1998 - 2006

Date	Place	State	Casualties	Impacts
17/10/98	Jesse	Delta	Over 1300	Pollution, damage to farm lands, over 400 people seriously injured
22/04/99	Bayana	Delta	10	Water and air pollution, damage to farm lands
08/06/99	Akute Odo	Ogun	15	Land and air pollution, damage to farmlands
13/10/99	Ekakpamre	Delta	12	Environmental pollution, damage to farm lands, flora and fauna
14/01/00	Gana	Delta	12	Environmental pollution, damage to farm lands
07/02/00	Ogwe	Abia	15	Environmental pollution, damage to farm lands
20/02/00	Lagos	Lagos	3	Environmental pollution, damage to canoes
14/04/00	Umugbede	Abia	50	Environmental pollution, damage to farm lands
22/04/00	UzoUwani	Enugu	6	Environmental pollution, damage to farmlands
03/06/00	Adeje	Delta	Unknown	Destruction of forest, high tension power cable of 2 electricity plants, youth/ police clash
20/06/00	Okuedjeba	Delta	Unknown	Environmental pollution, damage to farm lands
10/07/00	Adeje-Okpe	Delta	150	Environmental pollution, damage to farm lands
10/07/00	Oviri Court	Delta	300	Environmental pollution, damage to farm lands, injuries to scores of people
05/11/01	Umudike	Imo	3	Several bicycles burnt, about 17 persons injured
19/06/03	Onitcha Umiyi	Abia	125	Damage to farm lands, dozens of people injured
06/01/04	Elikpokwodu	Rivers	Unknown	Damage to over 200 ha of farm lands and properties worth millions of naira
30/07/04	Aghani	Enugu	7	Environmental pollution, injuries to many people
16/04/04	Ijegu	Lagos	60	Air and water pollution
14/12/04	Imore	Lagos	500	Environmental pollution
20/05/05	Akinfo	Oyo	1	34 persons injure, 15 of which died 11 days after
13/01/06	Iyeke	Edo	7	Damage to farm lands, injuries to 6 persons
12/05/06	Ilado	Lagos	150	Anything within 20 metre of scene burnt, scores of people injured, water pollution
02/12/06	Ijedodo	Lagos	1	Environmental pollution, damage to farm lands
26/12/06	Abule Egba	Lagos	500	40 vehicles, 2 churches, a Mosque, scores of homes, businesses; grocery shops, workshops, timber shops, sawmill, burnt

**Source:** Compiled by author from various newspapers, magazines and personal records

Delayed repair of aged leaking pipeline often attract crowds of desperate poverty stricken people who scoop up buckets of fuel, to sell, resulting in fire disasters. For instance, over 1000 persons died in an inferno at Jesse, Delta State in 1998, while scooping fuel from a burst NNPC pipeline to sell. Most probably, the danger of possible inferno never made any impact on them until the explosion occurred. A year after, over 12 people lost their lives in a similar incidence in Ekakpamre in in Delta State. While over 300 persons were similarly burnt to death in Egborode village, also in Delta State in 2000.

### CONCLUSION

Until the advent of oil, a delicate balance existed between the people of the Niger Delta and its fragile ecosystem. Exploitation of natural resources was in the main, rudimentary and did not go beyond the search for medicinal herbs, fuel wood, game, fish and construction materials. Environmental sustainability was maintained as available resources outmatched the needs of the people. Today, the Niger Delta environment has changed and continues to change rapidly. Negative effects of oil and gas activities have infringed on the environment, resulting in alteration of habitats and biodiversity loss from pollution. Thus, there is a strong feeling in the region that the degree and rate of impacts of oil activities on the environment is pushing the region towards an ecological disaster. The impacts of oil activities on the environment have been further exacerbated by its potential adverse effects on people's health. Myriads researches have established a strong linkage between oil pollution and people's health, and the Niger Delta, it appears, is no exception. The study has established the fact that effects of oil activities have resulted in acute health problems and fatalities for the people in the region. Thus the environmental condition being precipitated by oil activities in the Niger Delta is such that, it is destroying the sociological foundation of the existence of the people.

### REFERENCES

- [1] Achudume, A.C. (2009). The effect of petrochemical effluent on the water quality of Ubeji creek in Niger Delta of Nigeria. *Bulletin of Environmental Contamination and Toxicology* 83(3):410–415.
- [2] Agada, E. G. O. (1994). Heavy Metals Concentration in Fish Fauna of Warri River and its tributaries. Ph.D theses, University of Benin, Nigeria.
- [3] Aggrey, M.M. (1983). Gas Flaring and Future life in the Niger Delta. Paper delivered at the National Conference on Petroleum Production in Nigeria, Lagos. 7th – 8th, October.
- [4] Akinbobola, O.I.; Njor, B.E. (2014). EnvironmentalWorry of River State Residents in the Niger Delta Region, *Nigeria.Psychology*, 5, 32–37.
- [5] Aekplakorn W, Loomis D, Vichit-Vadakan N, Shy C, Wongtim S, Vitayanon P. (2003). Acute effect of sulphur dioxide from a power plant on pulmonary function of children, *Thailand. Int J Epidemiol.* 32:854–61
- [6] Ake, C. (1996), *Democracy and Development in Africa*. Spectrum Books Ltd, Ibadan,
- [7] Alakpodia, I. J. (1989). "The Effects of Gas Flaring on the Micro- Climate and Adjacent Vegetation in Isoko Area of Bendel State," Unpublished M.Sc. Thesis, University of Ibadan.
- [8] Alakpodia, I.J. (1995). The oil industry and the economic environment of the Niger Delta. Paper Presented at the 30<sup>th</sup> Annual Conference, Nigeria Geographical Association, at the University of Benin, Benin City, Nigeria.
- [9] Alrumman, S.A., El-kott, A.F. and Kehsk, M.A. (2016). Water pollution: Source and treatment. *American journal of Environmental Engineering.* 2016;6(3):88-98.
- [10] Awobanjo, S.A. (1981). Oil spillage in Nigeria: 1976 – 1980, Paper presented at the 1981 International Seminar on the Oil Industry, Lagos, NNPC.
- [11] Anozie, A. N., Bakare, A. R., Sonibare, A. J., and Oyebisi, T. O. (2007). Evaluation of cooking energy cost, efficiency, impact on air pollution and policy in Nigeria. *Energy*, 32, 1283-1290.
- [12] Ashton-Jones, N. (1998). *The Human Ecosystems of the Niger Delta*. Ibadan; Krat books, Ltd.
- [13] Bibi, S., Khan, R. L., Nazir, R, et al. (2016). Heavy metals in drinking water of Lakki Marwat District, KPK, Pakistan. *World applied sciences journal.*34(1):15-19.
- [14] Boyden, C. R. (1974). Trace element content and body size in mollusk. *Nature*, 251, 311–314.
- [15] Briggs, D. (2003). Environmental pollution and the global burden of disease. *British medical bulletin.* 68:1-24.
- [16] Castillejos, M., D.R. Gold, D. Dockery, T. Tosteson, T. Baum and Speizer, F.E. (1992). Effects of ambient ozone on respiratory function and symptoms in Mexico City schoolchildren. *Am. Rev. Respir. Dis.*, 145(2): 276-282.
- [17] Castillejos, M., D.R. Gold, A.I. Damokosh, P. Serrano, G. Allen and McDonnell, W.F. (1995). Acute effects of ozone on the pulmonary function of exercising schoolchildren from

- Mexico City. *Am. J. Respir. Crit. Care Med.*, 152 (5): 1501-1507
- [18] Cedigaz, I. (2000). www.cedigaz.org.
- [19] Central Bank of Nigeria (CBN). (2004), Statistical Bulletin 15.
- [20] Chukwu, L. O., Brown, C. O. and Nwankwo, D. I. (1998). The impact of oil pollution on the hydrochemistry and biota of the tidal creeks and canals in Ondo State. *9th International Conference on the Petroleum Industry and the Nigerian Environment*, Abuja, November, 538-576.
- [21] Conceicao, G.M., Miraglia, S.G., Kishi, H.S., Saldiva, P.H. and Singer, J.M. (2001). Air pollution and child mortality: A time-series study in Sao Paulo, Brazil. *Environ Health Perspect.*, 109 (Suppl 3):347-50.
- [22] D'Andrea, M.A. (2013). Health consequences among subjects Involved in Gulf Oil spill clean-up activities. *Am. J. Med.*, 126, 966-974.
- [23] De Montclos, M.A. (1994). Le Nigéria. Kurthala, Paris. Cited in Luiselli, L. and Akani, G. C. (2003). An indirect assessment of the effects of oil pollution on the diversity and functioning of turtle communities in the Niger Delta, Nigeria.
- [24] Downs, M.A.; Palinkas, L.A.; Petterson, J.S.; Russell, J. (1993). Social, cultural, and psychological impacts of the Exxon-Valdez oil spill. *Hum. Organ.*, 52, 1-13.
- [25] Egborge, A.B.M. (1991). Industrialisation and heavy metal pollution in Warri River, 32nd Inaugural Lecture, University of Benin, Benin City, Nigeria.
- [26] Ekanem, I.N. (2001). Effects of Gas Flaring on the Soil, Air and Water Quality of Obigbo North. Centre for Env. And Science Education. Lagos State University 153p.
- [27] Embassy of Nigeria, (2001). Nigeria's profile: political and economical. Embassy of Nigeria Italy Quarterly Newsletter, 3(2000): 11-12.
- [28] Emuedo, C. O. (2010). Oil, the Nigerian State and Human Security in the Niger Delta. Unpublished P. hD Thesis University of Benin, Benin City, Nigeria.
- [29] Emuedo, A. O., Anoliefo, G.O. and Emuedo, C.O. (2012). Impact of Oil pollution on Heavy Metal Content of the Mangrove Ecosystem in some States of the Niger Delta. *Nigerian Journal of life Science*, 2(1):21-28.
- [30] Emuedo, A. O., Anoliefo, G.O. and Emuedo, C.O. (2014). Oil pollution and water Quality in the Niger Delta: Implication for Sustainability in the Mangrove Ecosystem. *Global Journal of Human-Social Science: B Geography, Geosciences, Environmental Disaster Management*. 14(6):9-16.
- [31] Emuedo, A. O. and Emuedo, C.O. (2018). Biodiversity and Oil Activities in the Niger Delta Region of Nigeria, *Journal of Geography, Environment and Earth Science International*, 14(3): 1-8.
- [32] Emuedo, C. O. and Emuedo, A. O. (2014). Oil activities, unsustainable environment and the combative reactionism of women in the Niger Delta. *African Journal of Political Science and International Relations*, 8(1):1-9, February.
- [33] Emuedo, C. and Abam, M. (2015). Oil, Land Alienation and Impoverishment in the Niger Delta, Nigeria. *European Journal of Research in Social Sciences*, 3 (2): 8-23.
- [34] Emuedo, C. O., Abam, M. and Oligbi, B. (2017). Environmental Insecurity and Erosion of Women Socio-economic Status in the Niger Delta, Nigeria. *International Journal of Social Sciences*, 6 (9):16-28.
- [35] Enehoro, A. (1973). Oil Production in Nigeria: Need for early reflection. Government Printer, Lagos.
- [36] Eromosele, V. E., (1998), Costing Niger Delta's oil spills: A Joint Stake holder's approach. *9th International Conference on the Petroleum Industry and the Nigerian Environment*, Abuja, November, 358-368.
- [37] Esparza, L, and Wilson, M., (1999), *Oil for Nothing: Multinational Corporations, Environmental Destruction, Death and Impunity in the Niger Delta*, USA: Inksworke Press.
- [38] Essoka, P.A., Ubogu, A.E. and Uzu, L. (2006). An overview of oil pollution and heavy metal concentration in Warri area, Nigeria. *Management and Environment Quality International Journal*, 17(2):209-215.
- [39] Ezemonye, L. I. N. (1992). Heavy metals concentration in waters, sediments and selected fish of Warri river and its tributaries. Ph.D thesis, University of Benin, Nigeria.
- [40] Fagade. O.E. (1990). Bacteria Biodegradation of Crude Oil from the Niger Delta Region of Nigeria Unpublished PhD Thesis, University of Ibadan.
- [41] Famuyiwa, B. A., (1998), Seabed Survey of the Impact of Oil based Drilling Fluid System on Offshore Environment. *9th International Conference on the Petroleum Industry and the Nigerian Environment*. Abuja, November, 461-489
- [42] Frynas, J. G. (2000). *Oil in Nigeria: Conflict and Litigation Between Oil Companies and Village Communities*, London: LIT VERLAG.
- [43] Gauderman, W.J., Gilliland, G.F., Vora, H. et al. (2002). Association between air pollution and lung function growth in southern California children. *Am J Respir Crit Care Med*. 166:76-84
- [44] Gauderman, J., Avol, E., Gilland, F.D., et al. (2004). The effect of air pollution on lung development from 10 to 18 years of age. *N Engl J Med*. 351:1051-67



- [45] Gerth, J. and L. Labaton, (2004), Shell withheld reserves data aid Nigeria. *New York Times*. March 19.
- [46] Gideon-Ogero J. E. (2008). Levels of Heavy Metals (Lead, Cadmium, Zinc, Magnesium and Copper) in Cassava from Niger Delta off Nigeria as an indication of Soil Environmental Pollution.
- [47] Gill, D.A., Picou, J.S. and Ritchie, L.A. (2012). The Exxon Valdez and BP oil spills: A comparison of initial social and psychological impacts. *Am. Behav. Sci.*, 56, 3–23.
- [48] Goldstein, B.D., Osofsky, H.J. and Lichtveld, M.Y. (2011). The Gulf oil spill. *N. Engl. J. Med.*, 364, 1334–1348.
- [49] Greenpeace International. (1994). “Shell-shocked, the environmental and social costs of living with Shell in Nigeria” website: <http://www.greenpeace.org/~conms/Ken/hell.html>.
- [50] Grevy, P. (1995). *The Niger Delta, Nigeria*. Draft Pollution Assessment Study, Submitted to the World Bank.
- [51] Guichaoua, Y. (2009). Oil and Political Violence in Nigeria. In Lesourne, and Ramsay, W. C., (ed.), *Governance of Oil in Africa: Unfinished Business*. The Institut Français des Relations Internationales (IFRI) Research Centre.
- [52] Glinianaia, S.V., Rankin, J., Bell, R., Pless-Mulloli, T. and Howel, D. (2004). Does particulate air pollution contribute to infant death? A systematic review. *Environ Health Perspect.* 112:1365–71.
- [53] Hicks, F.J. (1998). Enhancing the productivity of urban Africa. International Conference on Research Community for the Habitat Agenda Forum of Researchers on Human Settlements. Geneva., July 6-8, <http://wbln0018.worldbank.org:80/External/Urban/UrbanDev.nsf/Urban+Development/06FCBF7D26772E6885256B18007BA532?OpenDocument>
- [54] Ibhade, A. (2001). We can't stop Gas Flaring by 2004 Shell Petroleum Dev. Corp. Nigeria. [All.africa.com](http://All.africa.com)
- [55] Idoniboye, E.B. and Andy, A.I. (1985). ‘Effects of Oil Pollution on Aquatic Environment’, in *The Petroleum Industry and the Nigerian Environment*, Proceedings of An International Seminar Sponsored by Federal Ministry of Housing and Environment and NNPC, Port-Harcourt.
- [56] Ihorst, G., Frischer, T., Horak, F., et al. (2004). Long- and medium-term ozone effects on lung growth including a broad spectrum of exposure. *Eur Respir J.* 23:292–9.
- [57] Ikein, A. (1990). *The Impact of Oil on a Developing Country*, New York, Praeger.
- [58] Ikporukpo, C. O. (1999). ‘Petroleum, Fiscal Federalism Justice in Nigeria’, Paper delivered at IFRA Monthly Seminar, University of Ibadan, 7 July.
- [59] Ishishone, M. (2004). Gas flaring in the Niger Delta: the potential benefits of its reduction on the local economy and environment. <http://socrates.berkeley.edu/~es196/projects/2004final/ishisone.pdf>.
- [60] Jekel, J.F., Katz, D.L., Elmore, J.G. and Wild, D.M. (2007). *Introduction to Preventive Medicine in: Epidemiology, Biostatistics and Preventive Medicine*. 3rd Edition. WB Saunders, Philadelphia. p 225
- [61] Kashi, E. and Watts, M. (Ed.) (2008). *Curse of the Black Gold: 50 years of oil in the Niger Delta*. Powerhouse Books.
- [62] Khan, N., Hussain, S.T., Saboor, A., et al. (2013). Physiochemical investigation of the drinking water sources from Mardan, Khyber Pakhtunkhwa, Pakistan. *International journal of physical sciences*. 8(33):1661-71.
- [63] Kelishadi, R., Mirghaffari, N., Poursafa, P. and Gidding, S. S. (2009). “Lifestyle and environmental factors associated with inflammation, oxidative stress and insulin resistance in children,” *Atherosclerosis*, vol. 203, no. 1, pp. 311–319.
- [64] Kelishadi, R. and Poursafa, P. (2010). “Air pollution and non-respiratory health hazards for children,” *Archives of Medical Science*, vol. 6, no. 4, pp. 483–495.
- [65] Kim, J.H., Lim, D.H., Kim, J.K., Jeong, S.J. and Son, B.K. (2005). Effects of particulate matter (PM10) on the pulmonary function of middle-school children. *J Korean Med Sci.* 20:42–5.
- [66] Kponee, K.Z., Chiger, A., Kakulu, I.I., Vorhees, D. and Heiger-Bernays, W. (2015). Petroleum contaminated water and health symptoms: a cross-sectional pilot study in a rural Nigerian community. *Environ. Health*, 14, 1–8.
- [67] Leahey, D.M. Preston, K. and Strosher, M. (2001). Theoretical and observational assessments of flare efficiencies. *Journal of Air Waste Management Association*, 51(12):1610–1616.
- [68] Leonardi, G.S., D. Houthuijs, P.A. Steerenberg, T. Fletcher and Armstrong, B. (2000). Immune biomarkers in relation to particulate matter: A cross-sectional survey in 17 cities of central Europe. *Inhal. Toxicol.*, 12: 1-14.
- [69] Lin, C.A., Martins, M.A., Farhat, S.C., et al. (1999). Air pollution and respiratory illness of children in Sao Paulo, Brazil. *Paediatr Perinat Epidemiol.* 13:475–88.
- [70] Luginaah, I.N., Taylor, S.M., Elliot, S.J. and Eyles, J.D. (2000). A longitudinal study of the health impacts of a petroleum refinery. *Soc. Sci. Med.*, 50:1155–1166.

- [71] Luginaah, I.N., Taylor, S.M., Elliott, S.J. (2002). Community reappraisal of the perceived health effects of a petroleum refinery. *Soc. Sci. Med*, 55, 47–61.
- [72] Lyons, R.A., Temple, J.M., Evans, D., Fone, D.L. and Palmer, S.R. (1999). Acute health effects of the Sea Empress oil spill. *J. Epidemiol. Community Health*, 53, 306–310.
- [73] McCaskill, L. (2013). When oil attacks: Litigation options for Nigerian plaintiffs. *Health Matrix*, 22(2):535-588.
- [74] Manby, B. (1999a). *The Price of Oil: Corporate Responsibility and Human Rights Violations in Nigeria's Oil-Producing Communities*, USA, Human Rights Watch.
- [75] Marland, G., Boden, T. and Andres, R. J. (2007). Global, regional, and national CO<sub>2</sub> emissions. Trends: A Compendium of Data on Global Change. Carbon Dioxide Information Analysis Centre, Oak Ridge National Laboratory, U.S.A 2007. Online: [http://cdiac.ornl.gov/ftp/ndp030/nation.1751\\_2004.ems](http://cdiac.ornl.gov/ftp/ndp030/nation.1751_2004.ems)
- [76] Moffat, D. and Linden, O. (1995). “Perception and Reality Assessing Priorities for Sustainable Development in the Niger Delta, *Journal of the Human Environment*, 24 No 7-8 327-538
- [77] Moffat, D. and Olof, L. (1995). “Perception and Reality: Assessing Priorities for Sustainable Development in the Niger River Delta,” *Ambio*, 24 (7/8):527-538.
- [78] Niger Delta Environmental Survey (NDES). (1997), *Environment and Socio-economic Characteristics*. Phase 1 Report, Port Harcourt.
- [79] NNPC (Nigerian National Petroleum Corporation) (2009). Monthly Petroleum Information (MPI), September. [www.nnpcgroup.com/Portals/0/NNPC.../2009/57.September%20%20highlights.pdf](http://www.nnpcgroup.com/Portals/0/NNPC.../2009/57.September%20%20highlights.pdf)
- [80] Nriagu J (2011) Oil industry and the health of communities in the Niger Delta of Nigeria. In: Nriagu, J. O. (ed.) *Encyclopedia of Environmental Health*. Burlington: Elsevier, 240–250.
- [81] Nwachukwu, A. N.I., Chukwuocha, E. O., and Igbudu, O. (2012). A survey on the effects of air pollution on diseases of the people of Rivers State, Nigeria. *African Journal of Environmental Science and Technology*, Vol. 6(10):371-379, October
- [82] Obadina, V. (2000). “Gas flaring in Nigeria: Matters Arising.” *Oil Exploration J.*, 2:181-193.
- [83] Obajimi, M.O. (1998). Air Pollution – A Threat to Healthy Living in Nigerian Rural Towns. In *Current Issues in Nigerian Environment* (Osuntokun, A. ed.) Ibadan: Davidson Press. Pp 133-147.
- [84] Odilison, K. (1999). Issues in the purification of Rainwater from Oil Exploration area. *Ecol. Environ.*, 5(3):204 -215.
- [85] Oghifo, B. (2001). Nigeria Loses \$6bn yearly to Gas Flaring, *Nig. J. of Env.*, 24 (3), 18-24.
- [86] Olomo, R.O. and Omene, L. (1995). Environmental impact of oil spillage: A case of the operations of Shell Petroleum Development Company in Bornu, Rivers State. *Paper presented at the 38th Annual Conference of Nigerian Geographical Association*, University of Benin, May.
- [87] O’Neill, T. (2007). Nigeria oil: the curse of the black gold, hope and betrayal in the Niger Delta. National Geographic Magazine February 2007 Edition.
- [88] Oniero, S.B.R. and Aboribo, I. (2000). Environmental Pollution: The Hidden Hand of Death in Warri Milieu. A paper presented at a Conference organised by Economic Department, Delta State University Abraka October 2000
- [89] Onosode, G. (2003). *Environmental Issues and the Challenges of the Niger Delta: Perspectives for the Niger Delta Environmental Survey Process*. CIBN Press Lagos.
- [90] Orimoogunje, O.I.; Ayanlade, A.; Akinkuolie, T.A.; Odiong, A.U. (2010). Perception on the effect of gas flaring on the environment. *Res. J. Environ. Earth Sci.*, 2, 188–193.
- [91] Ostro, B., Lipsett, M., Mann, J., Braxton-Owens, H. and White, M. (2001). Air pollution and exacerbation of asthma in African-American children in Los Angeles. *Epidemiology*. ;12:200–8.
- [92] Otuya, B. O. Akporohnor, E. E. and Achuba F. I. (2008). Determination of heavy metals in toads exposed to oil polluted environment (Ekpan) Delta State, Nigeria. *Environmentalist* 28:405–408.
- [93] Ovuakporaye, S.I.; Aloamaka, C.P.; Ojeh, A.E.; Ejebe, E.; Mordi, J.C. (2012). Effect of Gas Flaring on Lung Function among Residents in Gas Flaring Community in Delta State, Nigeria. *Res. J. Environ. Earth Sci.*, 4, 525–528.
- [94] Oyebadejo, O. and Ugbaja, V. (1995). ‘Oil as Threat: Well Blowouts, Pipeline Failures, and Spills’, *Nigeria Oil and Gas Monthly*, September, Vol. 1, No.9.
- [95] Pawari, M.J. and Gawande, S. (2015). Ground water pollution and its consequence. *International journal of engineering research and general science*. 3(4):773-76.
- [96] Peled, R., Fridger, M., Bolitin, A, et al. (2005). Fine particles and meteorological conditions are associated with lung function in children with asthma living near two power plants. *Public Health*. 119:418–25.
- [97] Philips, D. J. M. (1976a). The common mussel *Mytilus edulis* as indicator of pollution by Zn, Cd, Pb and Cu (I). Effect of environmental variables on uptake of metals. *Marine Biology*, 38, 59–69.
- [98] Philips, D. J. M. (1976b). The common mussel *Mytilus edulis* as indicator of pollution by Zn, Cd, Pb and Cu, (II). Relationship of metals in

- the mussel to those discharged by industry. *Marine Biology*, 38, 71–80.
- [99] Piller, C., Sanders, C. and Dixon, R. (2007). Dark cloud over good works of Gates Foundation: The world's largest philanthropy pours money into investments that are hurting many of the people its grants aim to help. *Los Angeles Times*, 7 January.
- [100] Ransome-Kuti O., Sorungbe A.O.O, Oyegbite K.S., Bamisaye A., (1992) Strengthening primary health care at local government level – the Nigerian experience. Lagos. Federal Ministry of Health.
- [101] Roche, N. (2003). Environmental Health in: Luaccs AO, Gilles HM (Eds). *Short Textbook of Public Health Medicine for the Tropics*. 4th Edition. London Book Power pp. 337-351.
- [102] Romieu, I., F. Meneses, S. Ruiz, J. Huerta, J.J. Sienra and White, M. (1997). Effects of intermittent ozone exposure on peak expiratory flow and respiratory symptoms among asthmatic children in Mexico City. *Arch. Environ. Health*, 52: 368-376.
- [103] RWI (Revenue Watch Institute) (2010). *The Big Survey Results – RWI Watch Index*
- [104] Shima M, Nitta Y, Ando M, Adachi, M. (2002). Effects of air pollution on the prevalence and incidence of asthma in children. *Arch Environ Health*. 2002;57:529–35
- [105] Schultz-Baldes, M. (1974). Lead uptake from sea water and food and loss in common mussel *mytilus edulis*. *Marine Biology*, 25, 177–193.
- [106] Stvendsen, E.R., K.B. Yeatts, D. Peden, S. Orton, N.E. Alexis, J. Creason and Williams, R. (2007). Circulating neurophil CD14 expression and the inverse association of ambient particulate matter on lung function in children. *Ann. Allergy. Asthma. Immunol.*, 99: 244-253.
- [107] Taiwo, O. and Akin-Aina, T. (1991). 'Environmental Implications of Oil Production and Policy Framework in Nigeria', in S. Tomori, ed., *Oil and Gas Sector in the Nigerian Economy*, Lagos: Faculty of Social Sciences, University of Lagos, Nigeria.
- [108] U.S. Energy Information Administration. Nigeria: Country Analysis Brief; 2005.
- [109] USEIA (Nigeria. US Energy Information Administration) (2014).. Country Analysis: <http://www.eia.gov/countries/country-data.cfm?fips=ni>.
- [110] USEPA, (U.S. Environmental Protection Agency) (2003). *EPA'S REPORT ON THE ENVIRONMENT*. U.S. Environmental Protection Agency, Washington, DC.
- [111] Watts, M., (2007), "The Rule of Oil: Petro-Politics and the Anatomy of an Insurgency". A Paper Delivered to the "Oil and Politics" Conference, Goldsmiths College, University of London, May 10-11.
- [112] Watts, M. (2008). "Sweet and Sour." In. Watts, M. and Kashi, E. (ed.) *Curse of the Black Gold: 50 years of oil in the Niger Delta*. Powerhouse Books. 37-63.
- [113] WHO (World Health Organisation) (1948). *Constitution of the World Health Organisation*. Geneva: World Health Organisation.
- [114] WHO (World Health Organisation). (2002). *The Health Effects of Industry Air Pollution Exposure in Developing Countries*. Published by WHO, Geneva, Switzerland.
- [115] WHO (World Health Organisation), (2009). *Preventing disease through healthy environments: Towards an estimate of the environmental burden of disease*. Available online: [http://www.who.int/quantifying\\_ehimp/acts/publications/preventing\\_disease/en/index.html](http://www.who.int/quantifying_ehimp/acts/publications/preventing_disease/en/index.html) (accessed 23 June 2009).
- [116] Wikipedia (2007), [http:// en. Wikipedia. org/ Wiki/Environmental Issues in Nigeria/Niger Delta](http://en.wikipedia.org/wiki/Environmental_Issues_in_Nigeria/Niger_Delta).
- [117] World Bank, (1995). *Defining an Environmental Development Strategy for the Niger Delta*, Vol. II, Washington D.C. Industry and Energy Operations Division (West Central Africa Department).
- [118] Wunder, S. (2003). *Oil Wealth and the Fate of the Forest*. London: Routledge.

**Citation:** Crosdel O. Emuedo and Okeoghene A. Emuedo, "Oil Activities, the Environment and Health Insecurity Concerns in the Niger Delta", *Journal of International politics*, 2019, 1(4), pp. 40-54

**Copyright:** © 2019 Crosdel O. Emuedo. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.